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Firms join to speed frame relay rollout

By Jim Brown
Senior Editor

Four vendors last week announced a jointly developed frame relay specification, based on emerging U.S. and international standards, that will enable them to build compatible frame relay interfaces while the standards are being finalized.

Adoption of the specification, which may be supported by other suppliers, could speed the delivery of products users can mix and match in networks utilizing frame relay technology. Products from the four vendors are due out in early 1991.

The specification, developed by cisco Systems, Inc., Digital Equipment Corp., Northern Telecom, Inc. and StrataCom, Inc., is based on draft ANSI and Consultative Committee on International Telephony and Telegraphy standards for frame relay.

The ANSI standard is expected to be approved late next year, and the CCITT standard should be finalized about six months later, according to analysts.

"The joint spec is not as complete as the ANSI draft spec is," said Steve Taylor, a principal with Distributed Networking Associates, a telecommunications planning and research organiza-

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PHOTO ©1990 LUC NOVOVITCH/GAMMA LIAISON

IBM's George Conrades (left) and Carl Conti display new mainframe.

IBM widens LAN portfolio with array of new tools

Offerings expand net control, connectivity options.

By Paul Desmond
Senior Editor

POUGHKEEPSIE, N.Y. — IBM last week beefed up its local-area network product line with new LAN management offerings, its first intelligent LAN hub and software that supports LAN traffic across SNA backbones.

The new IBM LAN Network Manager is an enhanced version of LAN Manager, IBM's existing LAN management product.

In addition to monitoring error conditions on IBM Token-Ring Networks, the LAN Network Manager can collect detailed information on LAN-attached devices through another new product, the IBM Station Manager. It can also work with IBM's new 8230 Token-Ring Network Controlled Access Unit (CAU), a hub that can support as many as 80 devices in an IEEE 802.5-compliant token-ring LAN, to enable or disable individual workstations.

LAN Network Manager can be used stand-alone to manage a single LAN or with NetView for centralized control over multiple LANs. It uses OS/2 Extended Edition's Data Base Manager to store management data.

IBM also announced new software that lets LANs exchange data via LU 6.2 sessions across a

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IBM announcements set stage for future

Abandons S/370 architecture, adds fiber channels and rolls out new controllers and host/LAN links.

By Paul Desmond
Senior Editor

POUGHKEEPSIE, N.Y. — IBM last week made its most sweeping product announcement in 25 years, highlighted by the introduction of a family of mainframes based on a new architecture and a slew of new network peripherals and management products.

The Enterprise System (ES)/9000 family of mainframes includes 18 models based on the new System/390 architecture, which is said to offer more flexibility in growth and connectivity plus better system management, availability and security than the System/370 architecture.

IBM rolls out SystemView, new version of NetView. See story, page 4.

The mainframes range from four rack-mountable models that provide up to twice the performance of the ES/9370 to eight water-cooled machines that offer two to three times the performance of IBM's top-of-the-line 3090.

IBM also announced three new Enterprise System Architecture (ESA) operating systems.

MVS/ESA, IBM's most powerful operating system that was previously available only on its largest processors, will also run on the new intermediate processors. It will support new features including dynamic reconfiguration, LU 6.2/Advanced Program-to-Program Communications, coop-

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INSIDE

LAN benchmarks: a status report. See story, page 51.

AT&T grants concessions on Tariff 12

By Bob Wallace
Senior Editor

JACKSONVILLE, Fla. — Tariff 12 is 3 years old this month and growing strong, but users of the AT&T custom network deals are still encountering bothersome billing problems and other administrative difficulties.

As problematic as the deals can be, AT&T has shown a great deal of flexibility in helping customers overcome the drawbacks and limitations of what has become its single biggest competitive weapon in the battle for the business of large corporate users.

Consider the case of CSX Technology Corp., a company that became a Tariff 12 customer in March and has since encountered many of the problems common to these complex custom

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INITIAL CCITT STANDARDS for multivendor videoconferencing come with limitations. Page 2.

BOEING TO TEST interoperability of software used to exchange compound documents. Page 2.

CABLETRON JOINS ranks of vendors supporting 16M bit/sec token rings on unshielded twisted-pair cabling. Page 4.

US WEST breaks with other RBHCs in offering free blocking for caller ID. Page 4.

BROADCAST FAXING is one alligator that can take a bite out of a company's time and budget. Page 82.

NEWSPAPER

FEATURE

LAN analyzers vary in testing, decoding ability

By Colin Mick and Dan Nagel
Special to Network World

The latest *Network World*/LanQuest Tests of local-area network protocol analyzers show that fundamental product differences will require users to scrutinize their individual net needs before buying an analyzer.

This LAN analyzer test addressed performance issues; a previous article ("Psychoanalyzing the neurotic LAN," *NW*, May 28) focused on features.

Eight leading Ethernet and token-ring analyzers were subjected to tests comparing their ability to monitor LAN operations, capture and display packets and decode five common LAN protocols. Each analyzer has a unique style and method of dealing with basic functions.

LAN analyzers typically perform several functions, including monitoring network operations, capturing packets

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Pilot offers PC version of executive information tool

Software gives managers access to wealth of business information across corporate network.

By Wayne Eckerson
Senior Writer

BOSTON — Pilot Executive Software today is expected to introduce a personal computer version of its host-based executive information system (EIS) that will enable users to retrieve and integrate data from multiple applications anywhere in a corporate network, as well as from external data services.

The new version is called LightShip and works under Microsoft Corp.'s Microsoft Windows 3.0, which provides a graphical user interface and a communications protocol called Dynamic Data Exchange (DDE).

DDE allows Microsoft Windows-based applications to communicate with one another across a network.

The software works in any local-area network that Microsoft Windows 3.0 supports, including Banyan Systems, Inc.'s VINES 4.0, Novell, Inc.'s NetWare 386 and 3Com Corp.'s 3+Open.

EISs are typically designed to enable executives to pull together critical business data, such as daily or weekly sales reports, from a variety of sources and present it in an easy-to-read, summary fashion using graphics, charts and text.

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Videoconference standards to bow with shortcomings

Px64 standard won't support some key features.

By Barton Crockett
Senior Editor

While emerging standards should make it easier to interconnect videoconferencing equipment from different vendors, limitations of the standards will lessen any impact they may have for two or more years.

Among other problems, the initial release of the CCITT Px64 standards will not support point-to-point videoconferencing links and will not provide for compressed audio.

Px64 is the working name given to a series of standards being finalized by the CCITT for interoperability between different vendor's coder/decoders (codec) at bandwidths ranging from 64K to 2.048M bit/sec.

These standards include: H.261, which specifies common formats for compressing video; H.230, which outlines intercodec signaling systems to be used in videoconferences; H.221, which establishes standards for multiplexing video, audio and graphical communications over a single link; and H.242, which stipulates how to set up and disconnect Px64-based links.

The text of these standards was approved in July by Working Party 1 of the CCITT and is now being presented to the member countries of the CCITT for final

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Boeing to test compatibility of ODIF software packs

By Jim Brown
Senior Editor

SEATTLE — Boeing Computer Services Co. this week will conduct an interoperability test between several software packages that support the Open Systems Interconnection's Office Document Interchange Format (ODIF).

The test is designed to determine how well compound documents created using text, graphics and other elements drawn from various vendors' computers can be exchanged over an X.400 network. It will also provide valuable information for the vendors providing software for the test.

In the test, Boeing intends to prepare a compound document and send it via an X.400 value-added network (VAN) service back to itself or to one of its trading partners, such as E.I. du Pont de Nemours & Co. in Wilmington, Del.

As of last week, du Pont was unsure whether it would be able to take part in the test.

"Du Pont is a supplier to us," said Joanna Vanderwilt, project director for Boeing's compound document interchange project. "We want to find out what a document looks like after it has gone to du Pont and what it would look like to us if they made changes and sent it back," she said.

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Briefs

Group to address technobabble. A group of users and vendors will meet on Tuesday at NetWorld '90 in Dallas to form an organization dedicated to developing standard local-area network benchmarking tests. The Performance Testing Alliance (PTA) will hold a two-hour meeting, with the first hour featuring presentations on the need for standard benchmarks for products including network interface cards, internetworking devices such as bridges and routers, network operating systems and network application software.

One of the speakers will discuss a document that has been developed within the Internet Engineering Task Force (IETF) to define terms relevant to benchmark tests for internetwork devices. Scott Bradner, a senior technical consultant at Harvard University and chairman of the IETF's Benchmark Methodology Working Group, said his group is developing a document that will define testing procedures and how to report the results of the tests.

Although those IETF documents could be made available to PTA, it has not been determined if PTA will focus on the same issues. The PTA will attempt to define testing and reporting methodologies, according to Ed Curry, president of Lone Star Evaluation Laboratories, Inc., a LAN test lab in Georgetown, Texas.

Curry will run the second half of the meeting, in which attendees will elect interim officers who will define the group's structure and begin work on development of test suites. The meeting is open to any NetWorld attendee. IBM and Novell, Inc. head a group of nine vendors that plan to attend. In addition to Harvard, Gannett Company, Inc. is expected to send a representative.

Prodigy uses BT Tymnet to extend reach. Prodigy Services Co., a joint venture of IBM and Sears Roebuck and Co., last week made its videotex services available in most major U.S. cities by teaming with BT Tymnet, Inc. to distribute Prodigy services. By dialing into BT Tymnet's public packet-switching network, users can access Prodigy services from more than 500 local access nodes nationwide. Previously, Prodigy only distributed its services from nodes in about 40 cities. According to Gerry Mueller, Prodigy's vice-president of systems operations and telecommunications, using BT Tymnet facilities has enabled Prodigy to extend its service nationwide far faster than was possible using private facilities, as had originally been planned.

Newbridge out of the red. Newbridge Networks, Inc.'s first-quarter results for fiscal 1991, which ended Aug. 3, shows the company has climbed back into the black. The company reported net income for the quarter of $180,000 (Canadian), compared to a loss of $6.9 million (Canadian) in the fourth quarter of last year. Net income for the comparable period in fiscal 1990 was $4.2 million.

Revenue for the first quarter was $38.1 million, an increase of 40% compared to revenues for the corresponding quarter of last year. Company Chairman Terence Matthews attributed the return to profitability to increased business activity with telephone companies and private businesses around the world and to cost-cutting efforts. The Newbridge installed base of different types of multiplexers now numbers more than 18,000, the company reported.

IBM, Metaphor form partnership. IBM and Metaphor Computer Systems, Inc. of Mountain View, Calif., last week announced the formation of Patriot Partners, a partnership that will sell development tools for building application software packages that can run under OS/2 and various versions of Unix, including IBM's AIX operating system. The products will eliminate the need for developers to build multiple applications for separate operating systems and hardware platforms. Patriot Partners, jointly owned by the two companies, extends a relationship between IBM and Metaphor that began in March 1988.

US Sprint racks up new wins. US Sprint Communications Co. last week announced that it signed three new contracts collectively worth more than $40 million. American Healthcare Systems in San Diego signed a three-year deal worth more than $36 million to implement a Virtual Private Network serving 1,100 sites in 45 states and the District of Columbia. Fireman's Fund Mortgage Corp. in Farmington Hills, Mich., signed a two-year, $2.2 million contract for Network WATS, the carrier's multilocation WATS offering, at its 50 U.S. sites. And ITT Corp. signed a three-year, multimillion-dollar contract for a variety of US Sprint inbound and outbound calling services.

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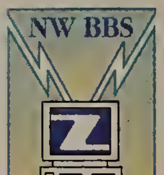

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See The FAXNeT Form on Page 57

Cabletron set to unveil 4M, 16M token-ring products

LAN hub, PC interfaces, mgmt. wares to bow.

By Tom Smith
New Products Editor

DALLAS — Cabletron Systems, Inc. is expected to announce at this week's NetWorld '90 show in Dallas new 4M and 16M bit/sec token-ring products, including LAN hubs and personal computer interfaces supporting shielded and unshielded twisted-pair wiring, as well as management and bridging products.

With the announcements, Cabletron will become one of a handful of vendors supporting 16M bit/sec token rings on unshielded twisted-pair cabling. Other vendors shipping such products include Proteon, Inc. and SynOptics Communications, Inc. ("SynOptics adds 16M boards for unshielded wiring nets," *NW*, Aug. 27).

Cabletron's new products are primarily for the firm's Multi-Media Access Center (MMAC), a local-area network hub that previously supported Ethernets based on shielded and unshielded twisted-pair wire, as well as fiber-optic and thick and thin Ethernet cabling. The company also offers Ethernet management, bridging and repeater capabilities.

Cabletron's NetWorld introductions will include an interface board for the MMAC that enables a user to link as many as 12 token-ring nodes into the hub using shielded and unshielded twisted-pair cable.

The company will offer two interfaces for unshielded twisted-pair wire, the Token Ring Media Interface Module (TRMIM)-20PR and TRMIM-22. The TRMIM-20PR has 10 ports to support individual token-ring nodes over telephone-type wiring at distances up to 100 meters. It also has ring-in/ring-out ports that can be used to daisy-chain the interface to two other MMAC chassis to create a larger ring.

TRMIM-22 provides 12 ports, for connection of token-ring nodes, but not ring-in/ring-out ports.

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TRMIM-22 provides 12 ports for connection of token-ring nodes but does not have ring-in/ring-out ports. Because MMAC can house as many as seven TRMIM interfaces, a single hub can support a ring consisting of 84 nodes.

The shielded twisted-pair interfaces are the TRMIM-10R and the TRMIM-12. The former supports 10 workstation connections at distances up to 200 meters, as well as two ring-in/ring-out ports for creating larger rings. The TRMIM-12 has 12 ports for connecting token-ring nodes to the hub.

The shielded and unshielded twisted-pair interfaces are available now for $1,295 each.

Token-ring workstations that will be tied into MMAC will use new 16-bit, bus-mastering interface cards that Cabletron is expected to introduce this week. The company's Desktop Network Interface (DNI) cards come in three models: the T2010, T3010 and T6010, which support the Industry Standard Architecture bus, the Micro Channel Architecture bus and the Apple Computer, Inc. Macintosh II, respectively.

The new DNI cards support all major DOS- and OS/2-based network operating systems, including Novell, Inc.'s NetWare and Microsoft Corp.'s OS/2 LAN Manager. The company is also developing Unix drivers.

The T2010 costs $995, and the T3010 and T6010 cost $1,295 each. They are scheduled to be available in 60 days.

For users that need to extend the distance between connected

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US West plans to offer free blocking with its caller ID

By Anita Taff
Washington Bureau Chief

OMAHA, Neb. — US West, Inc. has broken ranks with its RBHC counterparts by becoming the first local carrier to voluntarily offer free telephone number blocking in conjunction with its caller identification service.

US West Communications, a subsidiary of US West, last month rolled out its first caller ID offering as part of a five-month trial of several new call management services. The initial trial is targeted at small business customers, but a trial for residential users is scheduled for early next year in Boise, Idaho.

In the Boise trial, caller ID customers will receive the originating phone number and the first 15 letters of the caller's first and last names. Caller ID services offered by other carriers typically transmit only the originating telephone number.

US West will allow callers to block transmission of their telephone numbers and names at no cost on a call-by-call basis. To block the transmission, the caller will be required to dial a code number before making a call.

Since Bell Atlantic Corp. rolled out the first caller ID service in New Jersey two years ago, automatic number identification has stirred a bitter debate between privacy advocates and proponents of the new technology. Representatives of both sides have argued the issue before regulatory officials in several states.

Congress mulls legislation

The battle over caller ID has grown so fierce that Congress is considering legislation governing the service. The Federal Communications Commission is also considering a request from a New York engineer to establish standards for caller ID ("FCC may be referee in caller ID dispute," page 13). The laws could extend beyond caller ID, possibly restricting the collection of numbers through Integrated Services Digital Network, 800 or 900 services.

Until now, Bell Atlantic and BellSouth Corp., the two most active regional Bell holding companies in introducing caller ID, have staunchly maintained that the benefits of the service significantly outweigh the problems and have refused to offer blocking, free or otherwise. In some cases, the RBHCs have been willing to provide blocking for law enforcement or crisis agencies.

Both companies claim that allowing callers to block their numbers seriously diminishes the value of the service. Bell Atlantic officials have said that blocking will benefit only those who wish to misuse the telephone.

But Bob Grant, vice-president of marketing at US West Communications, disagreed. "We believe that both customers — the calling party and the called party — ought to have the freedom of choice," he said. "By offering per-call blocking free of charge, we offer both [customers] choices.

Grant acknowledged that blocking may limit the value of the caller ID service somewhat but said the effect will be minimal. In a technical trial held earlier this year, the carrier found that only 50% of the customers used blocking even once and that no one blocked their number every time.

In its analysis of the issue, US West determined that blocking for caller ID required no new software and any associated costs could be absorbed by the fees customers pay to subscribe to the service.

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IBM rolls out cohesive net management architecture

By Paul Desmond
Senior Editor

POUGHKEEPSIE, N.Y. — As expected, IBM last week unveiled SystemView, its architecture for developing cohesive network and systems management products, along with a variety of new net management tools.

Among those tools was Version 2 of IBM's NetView, which includes such long-awaited enhancements as an OS/2-based graphics interface and support for IBM's LU 6.2 transport protocol. Additionally, IBM enhanced NetView's automation capabilities and announced a link between NetView and the Information/Management problem management system.

SystemView is a Systems Application Architecture-compliant blueprint for developing management products that share a consistent user interface and utilize common management data. SystemView is designed to improve automation of various network and systems management operations and increase the level of integration among management software from IBM, third-party vendors and users.

Analysts compared SystemView to Digital Equipment Corp.'s Enterprise Management Architecture (EMA) because both will have systems and network management tools sharing a common management information base.

"This says IBM is being more open in allowing third parties to develop network management and systems management applications," said David Passmore, a partner at Ernst & Young's Network Strategies, Inc., a network consulting practice in Fairfax, Va.

The first SystemView-compatible products were also announced last week, including the OS/2-based NetView Graphic Monitor Facility (GMF) — the first implementation of SystemView's standard user interface.

As expected, there are limitations with the first release of NetView GMF, including its inability to support non-SNA devices or to control devices other than by establishing a 3270 emulation session. In addition, the product can graphically depict only PU 2 devices or above, not individual logical units or terminals.

IBM's current NetView graphi-

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New Net Courier supports messaging over X.25 VANs

Consumers Software extends E-mail to 3rd parties.

By Tom Smith
New Products Editor

DALLAS — Consumers Software, Inc. is scheduled to introduce at NetWorld '90 here next week a new version of The Network Courier electronic mail software that offers enhancements for connecting to wide-area networks and third-party messaging systems.

Version 2.1 of The Network Courier, which is messaging software for personal computers in local-area networks, lets users transmit messages over wide-area X.25 value-added networks for the first time.

The new version also supports optional gateways that let users exchange messages with users of mail systems that support Novell, Inc.'s Message Handling System (MHS) or the Simple Mail Transfer Protocol (SMTP). SMTP is the messaging protocol for Transmission Control Protocol/Internet Protocol LANs. A third gateway allows users to send messages to facsimile machines.

One of the key enhancements offered in The Network Courier 2.1 is a scripting function that lets users on a LAN log onto and transmit messages over X.25 value-added networks. The function lets users create scripts in which a series of commands, such as a sequence for logging onto a value-added network, can be assigned to a specific key. In the past, the software only enabled users to enter telephone numbers.

Another enhancement in Version 2.1 is the ability for remote users to dial into a LAN running The Network Courier and route messages through the net and out to other third-party E-mail systems. To achieve this, the remote user must be running one component of the company's existing Modem Mail software and a second Modem Mail component under The Network Courier on the accessed LAN. In the past, remote Modem Mail users could retrieve messages originating from the third-party mail systems but could not send messages.

The new capability will make

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Correction: The artwork for the story "Standardizing voice messaging," (*NW,* Sept. 3) contained an incorrect acronym for the Voice Messaging User Interface Forum (VMUIF). We regret the error.

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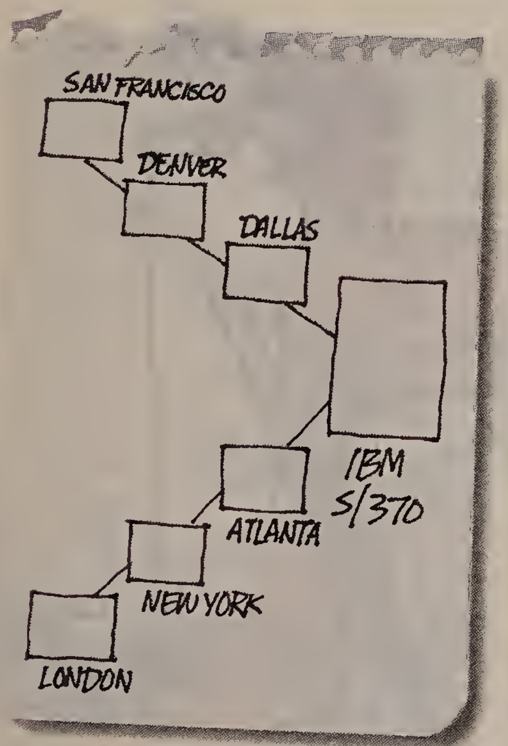

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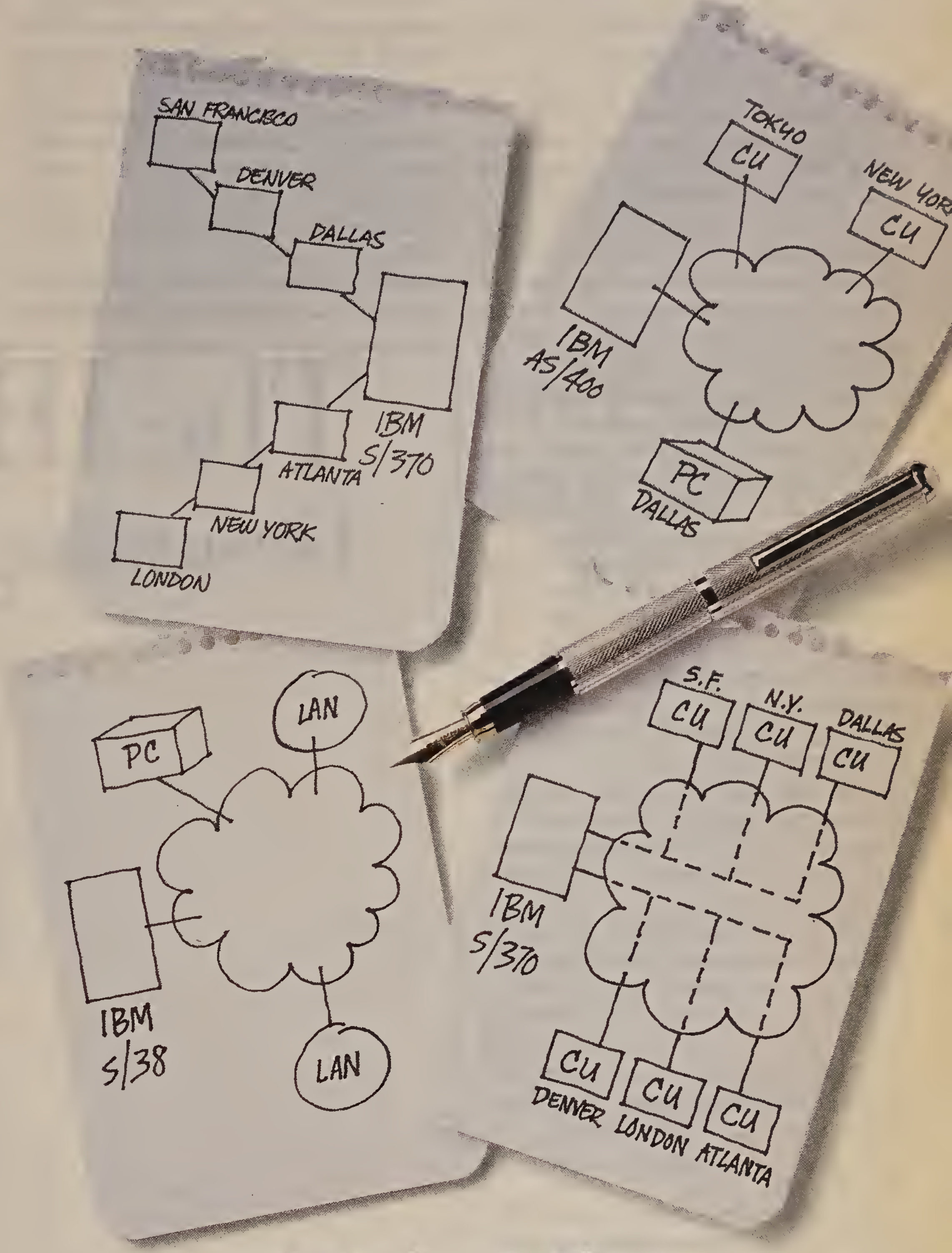

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COS seeks wider user involvement in steering open systems effort

New directions outlined in group's mission statement for '90s.

By Ellen Messmer
Washington Correspondent

McLEAN, Va. — The Corporation for Open Systems International (COS) said last week it intends to give users a greater role in defining the focus of the organization's open systems efforts.

In a mission statement dubbed "Vision for the 90s" issued last week, COS said it intends to serve as a forum for dialogue among users, vendors and other organizations, such as X/Open, to further the evolution of open systems. COS officials said COS and X/Open recently concluded initial agreements to work together.

The mission statement outlined four initiatives for the coming decade, with user involvement in establishing open systems requirements at the top of the list.

The plan will be presented to COS' board of directors for a vote in November.

COS Chief Operating Officer Steve Hudson said the group will address any open systems concerns user members share, including issues such as application software portability that have been outside COS' mission until now.

"The COS vision for the 90s is the open systems arena in general. Users want to influence the availability of open systems," Hudson said. "We would like COS to be a forum for that."

COS is currently holding talks with the Electric Power Research Institute (EPRI), the electric utility research group that recently defined open systems specifications for the industry, and the Houston 30, a group of IS and network managers from major corporations pushing for adoption of open systems.

Houston 30

Members of the Houston 30 are scheduled to hold their third meeting next week. They have indicated that they wish to join an established open systems organization, and COS is high on the list of possibilities.

Charles Gardner, a leader in the Houston 30 group and director of information technology infrastructure for Eastman Kodak Co.'s Photographic Products Group, welcomed the COS announcement regarding expansion of its focus.

Gardner noted that several companies active in the Houston 30 initiative — such as Boeing Computer Services Co., E.I. Du Pont de Nemours & Co. and General Motors Corp. — are also members of COS.

"In general, all of these companies are saying we need to consolidate efforts. We're being run ragged trying to follow everything [that's] going on," Gardner emphasized.

But Gardner, who sits on the COS board of directors and executive committee, acknowledged that COS may be spreading itself too thin.

COS suffered financial problems last year that resulted in staff layoffs. It has been forced to outsource development of OSI conformance test systems, and it never managed to develop its own OSI abstract test suites, which underlie the test systems. But both vendors and users continue to look to COS for leadership in the OSI effort.

COS officials conceded that they have not yet worked out a formal structure for accommodating the organization's expanded interests. But COS will continue to outsource specific tasks.

"There is a broadening, but there isn't a broadening of the inhouse work," said Lincoln Faurer, president and chief executive officer of COS.

Vendors last week voiced support for COS' plan.

Dan Sheinbein, director for information network architecture at AT&T Bell Laboratories, said that although the primary mission of COS still remains speeding OSI products to market, users would be able to define their needs more clearly with discussions of open systems in general.

Michael Zisman, a COS board of directors member and president and chief operating officer of Soft-Switch, Inc., said user dialogue is greatly needed in the organization.

The other initiatives outlined in the mission statement represent the continuation of past efforts.

As before, COS will pursue international agreements for common recognition of testing systems and tools. Although short on details, COS said it also plans to coordinate a U.S. position with ANSI, the Computer and Business Equipment Manufacturers Association and the National Institute of Standards and Technology.

Faurer said U.S. representatives to international standards groups should support a coordinated vision instead of contradictory positions.

In addition, COS said it will continue to promote and expand its educational and product-testing services.

To underscore the point, COS announced that it had expanded its conformance test program, the COS Mark program, to include two new OSI test systems. The X.400 Message Handling System and the File Transfer, Access and Management (FTAM) tests systems were added to eight other COS Mark tests for data communications standards. ☑

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Retiming device eliminates jitter problem on 16M bit/sec networks

Texas Instruments unveils patch to overcome chipset flaw.

By Laura DiDio
Senior Editor

DALLAS — Proteon, Inc. and Texas Instruments, Inc. will introduce at NetWorld '90 here tomorrow a patch for 16M bit/sec token-ring net interfaces to overcome a design flaw in TI's token-ring chipset that causes errors on nets with more than 15 nodes.

TI officials acknowledge that the company's Falcon chip, one of two chips in its token-ring chipset, has a jitter problem because it is susceptible to noise and vibrations generated by other components on 4M/16M bit/sec token-ring net interfaces. TI worked with Proteon to devise new circuitry to overcome the problem.

Proteon engineers had developed a retiming device that overcomes the jitter problem on 16M bit/sec networks, sources within Proteon who requested anonymity told *Network World*.

The retiming mechanism will be sold and marketed exclusively by TI, which makes the Falcon and Eagle chips used by all token-ring interface manufacturers except IBM. That vender has its own chipset, which does not suffer from the jitter problem.

The Proteon/TI retiming device will be sold separately to vendors of existing 16M bit/sec token-ring interfaces. In the future, however, the circuitry will be incorporated into a retooled version of the TI Falcon chip, the sources said.

Increased performance

In addition to solving the jitter problem, the new retiming device will boost the performance of 16M bit/sec token-ring adapters and let users achieve the maximum distance and node counts set forth in the IEEE 802.5 standard, according to the sources.

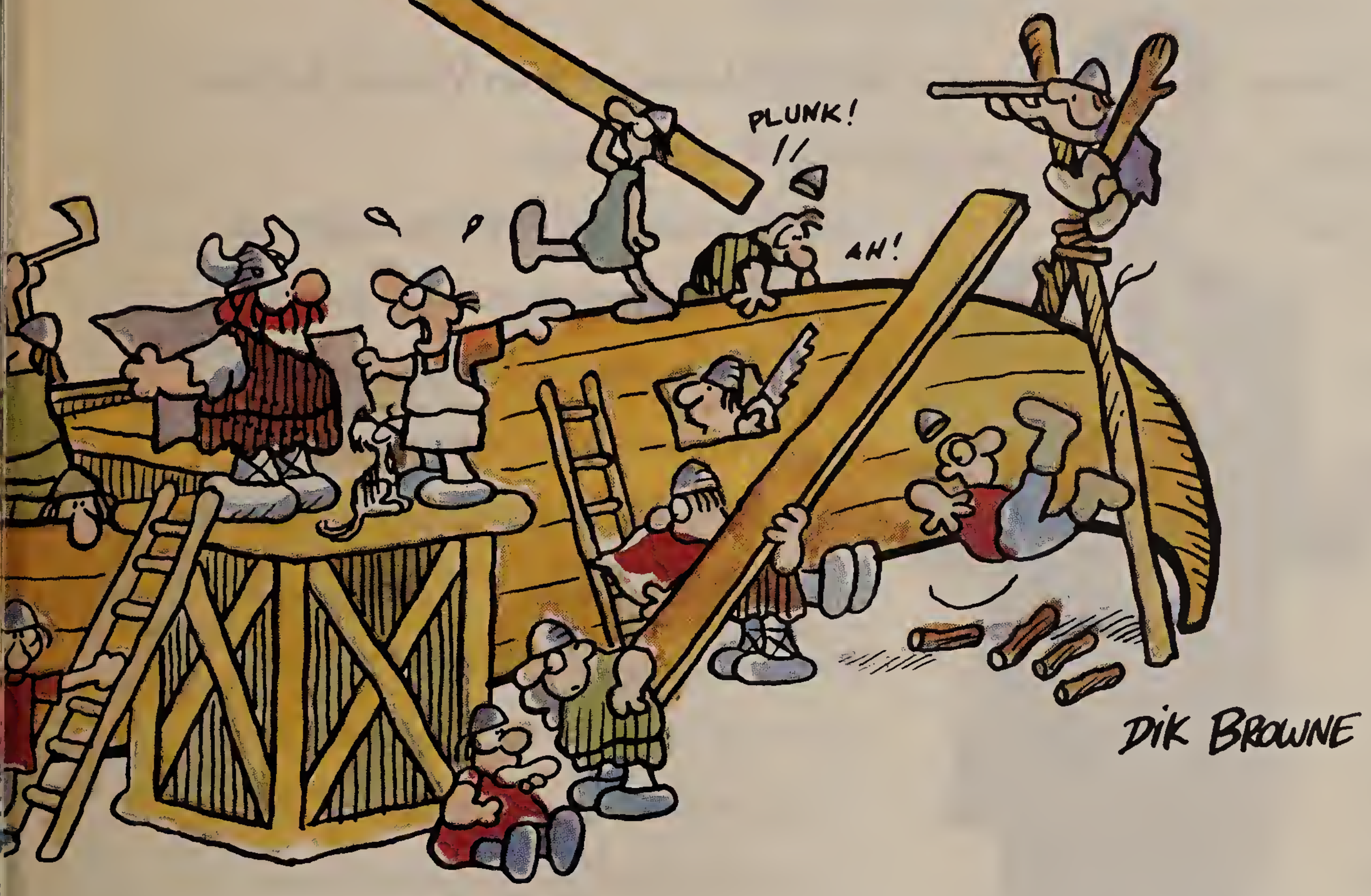
Before this, the 16M bit/sec token-ring adapters weren't able to achieve the

(continued on page 83)

> The retiming mechanism will be sold and marketed exclusively by TI, which makes the Falcon and Eagle chips.

▲▲▲

6000™ family.
will seem downright primitive.



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AT&T plans to lower FTS 2000 service rates

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — AT&T announced last week it is planning to lower rates by 10% for switched voice services on the Federal Telecommunications System (FTS) 2000 network beginning Oct. 1.

AT&T officials estimate that the rate reduction will save the government between $15 million and $20 million over the next fiscal year. Exact savings will depend on traffic levels and volume discounts of individual agencies on the network. AT&T serves 58 federal agencies under FTS 2000.

As part of the FTS 2000 contract, AT&T reevaluates its rates annually and determines whether prices can be lowered. AT&T began installation of FTS 2000 on Oct. 1, 1989.

Competitive pressures

Dennis Roth, AT&T vice-president of FTS 2000, said competitive pressures prompted AT&T to lower its rates.

"We've made a commitment up front that FTS 2000 would be competitive and reflect increased cost-effectiveness throughout the life of the contract," he said.

AT&T did not announce any price reductions for data or video services, but a spokesman said it is possible those rates would go down as well.

US Sprint reductions

US Sprint Communications Co. recently announced it will lower its FTS 2000 rates for 56K bit/sec data services, but the carrier did not provide details on the amount of the reduction. US Sprint has also lowered rates on T-1, enhanced 800, packet-switched data and dedicated access services.

FTS 2000 is a 10-year contract worth up to $25 billion for upgrading the federal government's aging network with new voice, data and video services.

The contract was split between AT&T, which won 60% of the contract, and US Sprint, which won 40%.

According to the terms of the contract, the rates will be rebid in the fourth and seventh years of the contract, and each vendor has the opportunity to win some of the traffic carried by the other.

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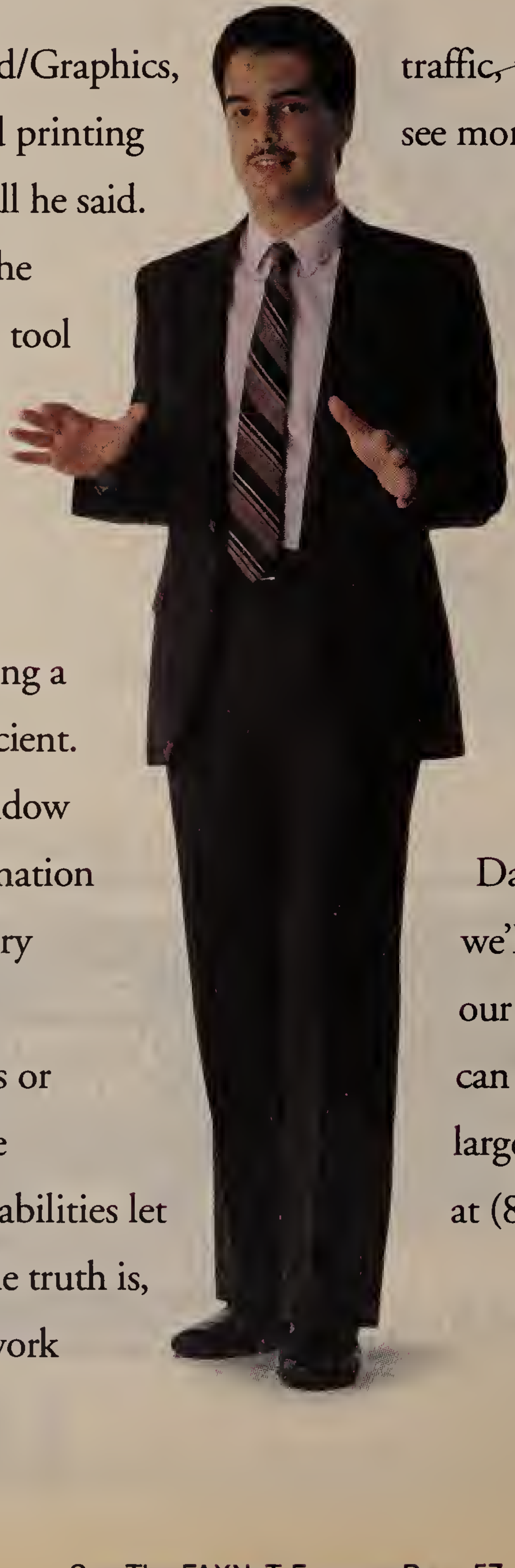

That's what Damian Drewek of Quad/Graphics, Inc., the nation's largest privately held printing company, told us. In fact, that's not all he said. Damian went on to emphasize how the WANmanager network management tool saves time and resources. But that's exactly what you should expect from Vitalink, the LAN internetworking specialist you can trust.

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

A recent study conducted by AT&T and TFS, Inc. revealed that 61% of 400 corporations surveyed were not evaluating ISDN. Of that, 38% said they would have an ISDN requirement in their RFPs for PBXs in 1990. Seventy-four percent of the respondents said they would require ISDN support by 1992, and 90% said they would require it by 1994.

People & Positions

Timeplex, Inc. last week said it has named **William Martin** vice-president of U.S. sales. Martin will now be responsible for U.S. sales for the company's three lines of business: commercial, carrier and federal.

Previously, Martin was Timeplex's national director of carrier sales.

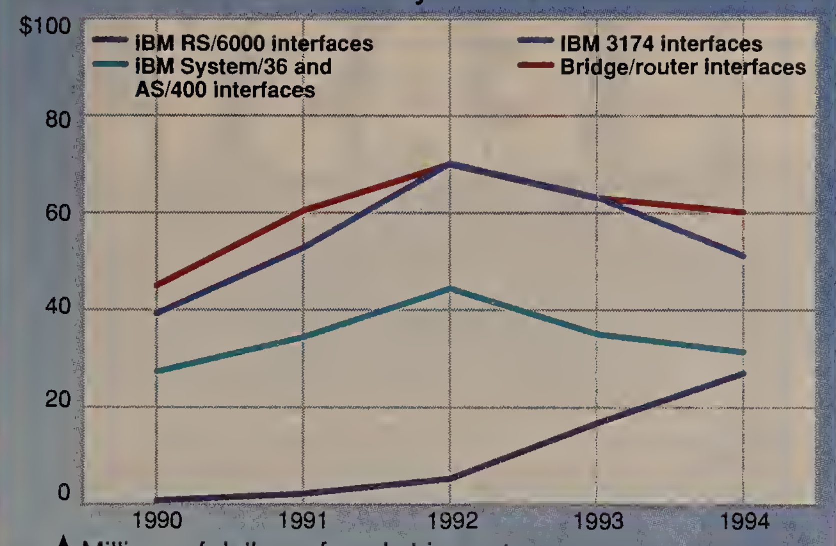
Codex Corp., a subsidiary of Motorola, Inc. based in Mansfield, Mass., last week announced the appointment of **Thomas Cook** to the posts of vice-president and general manager of the U.S. Customer Service Organization.

Before joining Codex, Cook served as vice-president of worldwide service at Timeplex, Inc.

Sungard Recovery Services last week said it has named **James Roynan** to the post of director of software development and **Joshua Dayanim** to the position of manager of product engineering. Previously, Roynan was manager of application development with The Arbitron Co. and Dayanim worked with AT&T Bell Laboratories in the area of systems engineering and network services planning.

Token-ring network interface forecast

Breakdown by host device



▲ Millions of dollars of card shipments

Although the market for token-ring LAN interfaces for PCs dwarfs other market segments – representing nearly $900 million in shipments in 1990 and rising to $1 billion next year – token-ring cards are being used in a widening range of devices.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

Systems Center gains Unix savvy with Unitech buyout

Plans to up Net/Master support for Unix devices.

By Charles Bruno
Assistant Managing Editor

RESTON, Va. — A top executive of Unitech Software, Inc., which is being acquired by Systems Center, Inc., last week said the company will provide its new parent with some much needed Unix expertise.

Paula Brooks, Unitech president, said the company's system administration tools for password control, backup management and security will play a key role in Systems Center's development effort to add support for Unix-based devices to its Net/Master network management software.

By incorporating those products into Net/Master, she explained, Systems Center will enable users to automate a number of networkwide administrative tasks, such as keeping tabs on file usage and automating backup procedures that can take over the instant Net/Master receives an alarm.

Privately held Unitech agreed last month to be acquired by Systems Center for between $4.5 million and $6.8 million ("Industry Briefs," *NW,* Aug. 27). Unitech posted sales of $1.8 million last year and expects to take in about $4 million in revenue this year, Brooks said.

Although the acquisition is not yet complete, Brooks said the deal received a nod from Systems Center's board of directors and awaits final approval by shareholders. She expects the deal to be completed by year end.

Both companies are already working to integrate Unitech's system administration tools into Systems Center's Net/Master net management software, Brooks said. "With a Net/Master effort already in place to support Unix, our backup and password tools fit into Net/Master nicely," she said.

Unlike system administration tools for specific vendors' systems, Unitech's UPASS password management, USECURE logon security program and UBACKUP network backup software operate on any vendors' Unix-based system.

"If a user is primarily a Sun [Microsystems, Inc.] shop, we're not going to be very successful in that environment," Brooks said. "But if it's a mixed-vendor Unix environment, nobody can match our support for multiple vendors' systems."

> "With a Net/Master effort in place to support Unix, our tools fit in nicely."
>
> ▲▲▲

Needs assessment

Brooks said Unitech foresees the need for improved alarm monitoring, resource utilization tracking and job accounting programs that could be incorporated

(continued on page 11)

NSA program results in secure net wares

Under CCEP, agency and private sector firms work together to build high-security products.

By Ellen Messmer
Washington Correspondent

FORT MEADE, Md. — A National Security Agency (NSA) program to aid vendors in developing secure communications products has resulted in the introduction of nearly 50 high-security voice and data products since 1984.

Under the the NSA's Commercial Communications Security (COMSEC) Endorsement Program (CCEP), vendors such as Motorola, Inc., RCA Corp., Rockwell International Corp. and Xerox Corp. have developed NSA-authorized products that are being used by government agencies and contractors in classified projects.

Under the program, the NSA first reviews product proposals submitted by vendors. If the agency deems the product worthy and the vendor commits to funding its development, the NSA will provide security experts to help develop the product.

Vendors that have worked with the NSA say the CCEP program contains both opportunities and risks. A company may emerge from the CCEP with a profitable new product and increased skills, but it must be financially prepared to weather sometimes lengthy delays in bringing its offering to market.

Vendors that have had success in CCEP projects, such as Motorola, emphasize the need to establish firm market projections for a proposed product before committing to development. The vendor does not receive funding from the NSA for CCEP projects, and the vendor alone is responsible for marketing the finished product.

"The CCEP is part of the NSA initiative to foster business relationships with the U.S. telecommunications industry," said Michael Conn, chief of information security at the NSA. "[But] in this partnership, the vendor bears the development and market risk."

The NSA, the nation's senior intelligence agency, initiated CCEP in 1984. The NSA largely abandoned its efforts to build secure products itself, determining

(continued on page 11)

INDUSTRY BRIEFS

INTELSAT sues Martin Marietta. The International Telecommunications Satellite Organization last week said it has filed suit against Martin Marietta Corp. to recover damages incurred as a result of a botched satellite launch last March.

INTELSAT is seeking to recover at least $400 million in losses stemming from the mishap. It alleges that a miswired Titan 3 rocket carried an INTELSAT F-3 satellite into an unusable orbit. The $145 million satellite would have provided for transatlantic phone traffic and television broadcasts.

In a lawsuit filed Aug. 31 in a federal district court in Baltimore, INTELSAT said Martin Marietta must bear responsibility for a miswired computer aboard the rocket. Among other allegations, the suit said Martin Marietta provided "false and misleading information" about the rocket's state of readiness.

An INTELSAT spokesman said the organization would like to conduct a rescue mission in February 1992, in which a space shuttle crew will attach a booster rocket to the satellite. That rocket would then carry the satellite to its proper orbit.

Bull first to receive COS Mark. Bull HN Information Systems, Inc. recently became the first supplier to receive the the COS Mark from the Corporation for Open Systems International (COS) for successful completion of IEEE 802.3 Ethernet conformance tests. The tests were performed on Bull's Local Area Controller Subsystem, an Ethernet interface that was tested in a DPS 6000 minicomputer. Bull is the first vendor to pass Open Systems Interconnection conformance tests for conformance to the physical-layer requirements of the OSI specification. COS developed the COS Mark program two years ago to affix its stamp of approval on OSI products.

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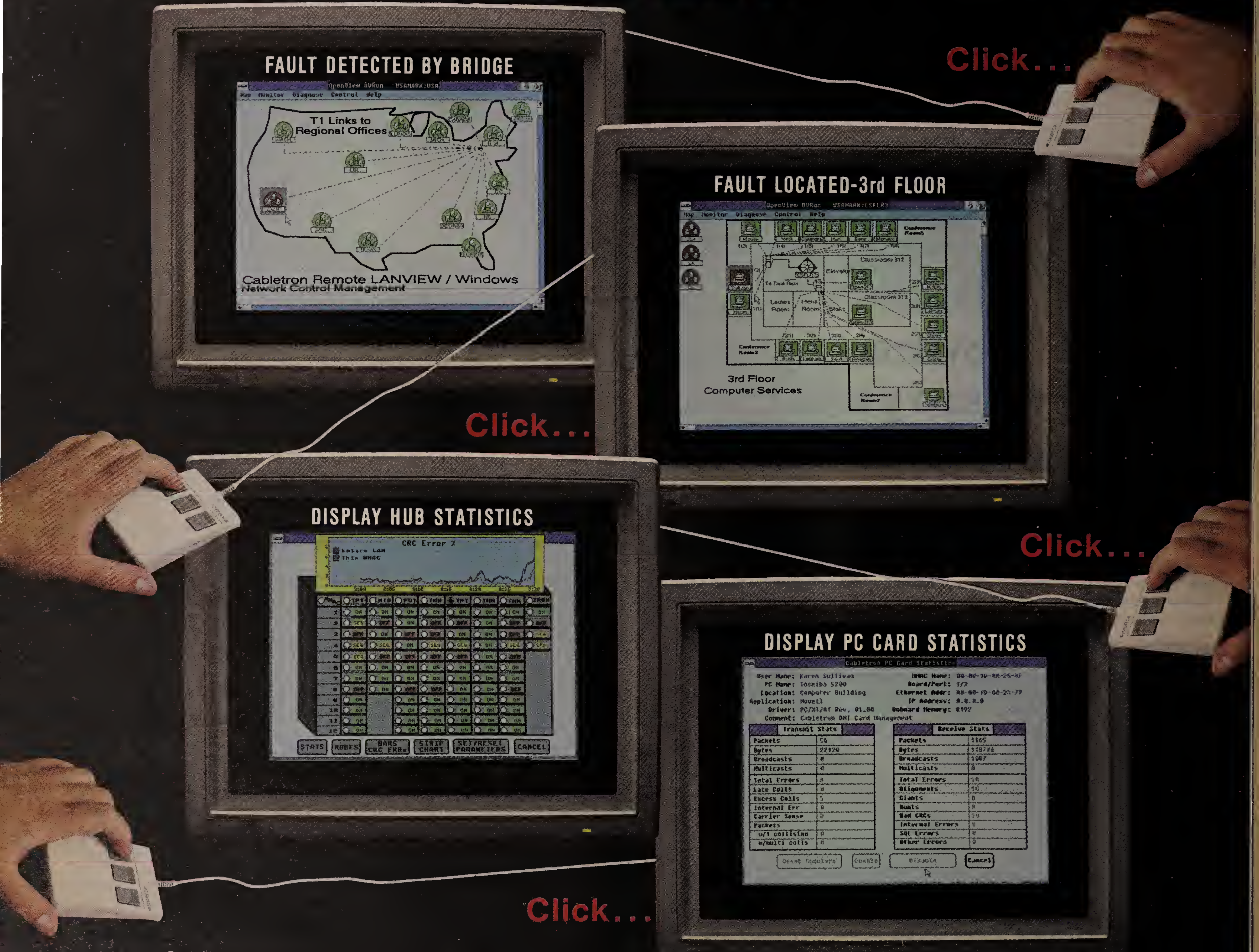

User Name: Karen Sullivan
PC Name: Toshiba 5200
Location: Computer Building
Application: Novell
Driver: PC/XT/AT Rev. 01.00
Comment: Cabletron DNI Card Management
MMAC Name: [illegible]
Board/Port: 1/2
Ethernet Addr: [illegible]
IP Address: 0.0.0.0
Onboard Memory: 8192

Transmit Stats	
Packets	56
Bytes	22120
Broadcasts	0
Multicasts	0
Total Errors	0
Late Colls	0
Excess Colls	5
Internal Err	0
Carrier Sense	0
Packets	
w/1 collision	0
w/multi colls	0

Receive Stats	
Packets	1165
Bytes	118736
Broadcasts	1087
Multicasts	0
Total Errors	39
Alignments	10
Giants	0
Runts	0
Bad CRCs	29
Internal Errors	0
SQE Errors	0
Other Errors	0

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NSA program results in secure net wares

continued from page 9

that the private sector was better able to handle development and high-volume production, and would reduce the cost of developing products.

Conn said CCEP is a means of bringing quality, inexpensive, secure network tools to the federal market.

NSA reviews proposals vendors submit for new product concepts and selects the ones that it determines to be beneficial to the government. The NSA also evaluates companies from a financial and security point of view. Vendors must be prepared for a rigorous development period, frequently lasting four years or more.

NSA has entered into partnerships with more than 50 vendors through Memorandums of Understanding and Memorandums of Agreement that vendors must sign before committing to building the products. The NSA stays in close contact with vendors throughout the product's life cycle to ensure compliance with security requirements. The product is also subject to final approval by the NSA.

Under the Memorandum of Agreement, if a vendor abandons a project, the NSA would have the right to complete and produce the product.

One product recently endorsed by the NSA under CCEP is San Diego-based Simpact Associates, Inc.'s UltraSafe SSP3110 data storage encryption device.

The innovative device encrypts data as it is stored onto disk or tape, thereby eliminating the need for end users to adhere to complicated security regulations for handling classified information stored electronically.

Users of the device do not have to store overnight disks or servers in a vault, and the disks can be transported by any employee or courier, instead of by specially authorized couriers.

But for Simpact, the NSA's endorsement of the product was a Pyrrhic victory.

Michael Ulrich, Simpact's vice-president of secure systems, said it is unlikely that the company will be able to recoup the expenses incurred in developing the device. Ulrich said the project took a year longer than expected — five years instead of the expected four — and the additional expenses incurred may result in losses on the project. In addition, the company said it faces an uncertain market for the product.

"In our case, it probably wasn't worth the risk," Ulrich said. "We probably won't do another one. We learned our lesson."

Ulrich said the NSA's procedure moves slowly, noting that months would go by without feedback from the agency. But Ulrich conceded that Simpact — eager to prove its technical prowess to the NSA — may not have accurately assessed demand for the product.

For Motorola, active in CCEP since the beginning, the experience has been a "learning curve," said David Kohler, program development manager at Motorola's Government Electronics Group.

In a 1984 NSA COMSEC initiative similar to CCEP, AT&T, Motorola and RCA responded to an NSA request to build a voice/data encryption device, the Secure Telephone Unit 3rd Generation (STU-III), of which the development was partially funded by the NSA.

Since its introduction in 1988, 170,000 STU-IIIs have been sold by the three vendors. "We've had several successful programs like the STU-III," Kohler said.

Motorola went on to build a STU-III cellular model and has committed to building a number of products, some for secure local-area networks, a topic of particular interest to the NSA.

Calling the COMSEC collaboration with NSA a team effort, Kohler said the NSA acted as a regulator, laying down technical guidelines for communications security. But he pointed out that Motorola has the sole responsibility for successfully marketing the products. ◼

Systems Center gains Unix savvy

continued from page 9

into a version of Net/Master for Unix systems.

"One of the biggest areas of demand that we've seen is for automated operations in the network management sector," Brooks said. "Given that, it seems reasonable that users would want fully automated recovery operations that could be kicked off by a alarm detected by the net management software."

Job accounting systems, in the form of chargeback systems for hardware and software utilization, are also becoming increasingly popular in the Unix community, Brooks added.

Young, but popular

Although only 5-years-old, Unitech already touts a reference list of roughly 240 customers, noting such users as Aetna Life Insurance Co., Eastman Kodak Co., Ford Motor Co., General Electric Co., McDonald's Corp., Trans World Airlines and Westinghouse Electric Co.

The company's products range in price from $1,000 to $45,000, depending on package and hardware versions.

While both companies' efforts to develop Unix support for Net/Master may not become evident for many months, Brooks said the Systems Center relationship will greatly enhance Unitech's goal of creating a presence in Europe, where demand for Unix is strong.

"What this deal tells customers is that we're going to be around for some time [and] that we're a safe investment," Brooks said. ◼

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The big one that got away.

Not long ago, Mr. Horace Abercrombie, head buyer for a large chain of seafood restaurants, made an important phone call to his *then* major fish supplier. It seems that with all of the excitement of planning a two-for-one promotion, Horace had completely overlooked ordering a couple of extra tons of delectables from the deep.

Horace dialed his supplier and heard, "Please wait for the next available operator." He did as he was asked, and waited. And waited. Soon, Horace developed a frustration that even the soothing pan flute music in the background couldn't assuage.

Horace began to panic that this delay would put his promotion in jeopardy. That's when he remembered a visit from Forward-Thinking Fresh Fish Inc.

Locating the energetic young salesman's card next to the antacid in his desk drawer, Horace hung up and then dialed Forward-Thinking's number. Upon hearing, "Please hold and a representative will be with you in two minutes," he sighed with relief.

You see, since he knew *when* his business would be tended to, he didn't get uptight. Before long, Forward-Thinking had reeled in a new account. And Horace's old supplier had let a big one get away.

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TELECOMMUNICATIONS

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Worth Noting

Globalization of the business community will drive sales of teleconferencing equipment from $488.6 million this year to $2.263 billion in 1995, a 400% increase, according to a study by Market Intelligence Research Corp., a Mountain View, Calif. research firm.

Carrier Watch

US Sprint Communications Co. last week said it signed a two-year, $78 million contract with National Carriers' Buyers Network (NCBN) to provide a variety of voice and data services to the consortium of regional carriers located in San Jose, Calif. NCBN members, midsize facilities-based carriers, will use US Sprint's outbound services, 800, operator services and digital private-line offerings to supplement their networks.

Williams Telecommunications Group, Inc. (WilTel), a long-haul service provider in Tulsa, Okla., last week completed construction of a fiber-optic route linking Los Angeles and San Francisco. WilTel ran about 80% of the 430-route-mile system through decommissioned pipelines owned by a sister company. The eight signal regeneration stations and three points of presence located along the route are housed in specially engineered structures designed to protect equipment and lines from the elements, a spokesman said.

The project presented a broad range of challenges, according to Gary Shaw, vice-president in charge of outside plant and construction. Forty miles of the route ran through highly developed urban areas north of Los Angeles. Workers also moved through mountain passes and national forests installing the fiber. ◘

US Sprint changes tariffs to keep aggregation in line

Other developments also take stage this summer.

By Daniel Briere
Contributing Editor

Aggregation, international calling and controversial 900 applications topped the list of noteworthy industry developments in the final month of this summer.

On the aggregation front, US Sprint Communications Co., following MCI Communications Corp.'s lead, recently revised the language in several tariffs in an effort to gain more control over who resells its services.

Like MCI, US Sprint will now calculate volume discounts based on traffic generated by "associated" and "nonassociated" network locations.

An associated site is a location that a customer owns or leases, or a business in which the customer owns at least a 20% interest; nonassociated sites are all other locations.

The impact of the language change will not be felt for some time, however. All nonassociated locations under US Sprint's Network WATS discount plan will be treated as associated locations as part of an ongoing promotion until the end of February 1991. And the carrier has been known to extend its promotions.

US Sprint also loosened some of the on-net-to-on-net restrictions that have kept aggregators and smaller customers away from VPN Option II, the carrier's highest discount program. Currently, users have to meet a minimum of 5% on-net-to-on-net traffic to qualify for the program. When the changes take effect, customers will be able to meet the 5% minimum using calls from off-net-to-on-net sites as well.

However, US Sprint has extended a waiver of the on-net provisions until Dec. 1 and may keep extending it as it does with other promotions.

In a separate development, US Sprint restructured its VPN FONCard rates in preparation for planned Global FONCard applications.

US Sprint started differentiating between interstate and international off-net-originated calls by adding new rate tables and language to its VPN FONCard tariff. The changes are necessary to lay the groundwork for "third coun-

(continued on page 14)

WASHINGTON UPDATE

BY ANITA TAFF

CWA groups vote to stop AT&T deregulation. Two regional groups of the Communications Workers of America (CWA) filed statements last week urging the Federal Communications Commission not to further deregulate AT&T in its proceedings to examine the carrier's market dominance.

Laura Unger, president of CWA Local 1150 in New York, told the FCC that giving AT&T more freedom could lead to deteriorating service quality. Unger claims that AT&T is already cutting back the work force it needs to maintain service quality and that deregulation would only hasten the process.

No group of users would be immune, Unger said. "The move to remove regulatory restraints on Tariff 12 offerings at the same time the Tariff 12 users feel the necessity of forming a user group to collectively deal with common service problems speaks to the need for further investigation," she said.

Paul Diaz, president of CWA Local 7050 in Tucson, Ariz., also opposed the deregulation of AT&T. He claims that AT&T still has substantial market power and, if given more freedom, could easily underbid competing carriers.

AT&T puts Tariff 15 deal on ice. At the request of the Federal Communications Commission, AT&T has deferred the effective date of its Tariff 15 deal for Schwan's Sales Enterprises, Inc. until Oct. 18. The deal for Schwan's, a manufacturer of frozen foods based in Marshall, Minn., was originally scheduled to take effect Sept. 3. The FCC needed more time to examine the offer, which would give Schwan's a 13% discount on Software-Defined Network service, an 8% discount on 800 Term Plan, Megacom 800, Basic 800 and 800 Readyline, and a 7% discount on AT&T World Connect calls. ◘

RBHC plans for caller ID and blocking

RBHC	Caller ID services status	Call-blocking policy
Ameritech	Not offering caller ID yet; has filed tariffs to offer service in Indiana and Ohio but is awaiting state approval	Does not intend to offer any blocking because it devalues service
Bell Atlantic Corp.	Offers caller ID in Maryland, New Jersey, Virginia and West Virginia	No blocking option
	Plans to offer service in Washington, D.C.	Plans to offer operator-assisted blocking for 45 cents
	Caller ID suspended in Pennsylvania	
BellSouth Corp.	Offers caller ID in Tennessee	No blocking
	Has filed tariffs to offer service in Alabama, Georgia and North Carolina but is awaiting state approval	No blocking
	Has filed plans for service in Florida and South Carolina	Plans to offer blocking for law enforcement and crisis intervention agencies
Nynex Corp.	Offers caller ID in Vermont	No blocking
	Plans to file tariff to offer service in Maine by year end	
Pacific Telesis Group	Plans to introduce caller ID in Los Angeles and San Francisco in 1991	Must offer free blocking due to state law
Southwestern Bell Corp.	Not offering caller ID	Expected to offer per-call blocking if it later offers service.
US West, Inc.	Conducting five-month market trial of caller ID in Omaha, Neb.	Plans to offer blocking free of charge

GRAPHIC BY SUSAN J. CHAMPENY

FCC may be referee in caller ID dispute

N.Y. engineer asks the commission to examine his proposal to solve the sticky privacy issue.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — At the urging of an engineer from New York, the Federal Communications Commission is considering whether it should step in to resolve the controversy over caller identification services.

Caller ID, which enables call recipients to identify the phone number of the calling party, has sparked a bitter debate between privacy advocates and the regional Bell holding companies. The controversy has become so heated that Congress is considering legislation on the issue.

Until now, the primary solution to privacy concerns was to offer customers the ability to block their number, on a call-by-call basis, from being transmitted to the called party. The RBHCs and state public utility commissions are now wrangling over whether to charge customers for the blocking, and that has led to a patchwork quilt of regulation across the nation.

Joseph Baer, an engineer in New York, has come up with a solution that he says will balance privacy interests and protect customers against telephone harassment. Baer suggests that instead of transmitting unlisted phone numbers of callers, a different identifier of 20 characters or less be substituted. This would prevent customers' unlisted numbers from being revealed but would still identify the caller through these coded characters.

Any call could be traced back if a number of harassing phone calls were being made from the same identifier. The identifier would also be useless to companies that want to telemarket products or compile telephone lists for sale to outside firms.

> Any call could be traced if a number of calls were being made from the same identifier.

▲▲▲

Caller ID services are now available only as an intra-LATA offering. No long-distance carrier offers forwarding of call information on residential 1+ calls, though they do forward call information on 800 and 900 calls.

Baer's proposal might help to create a more equitable, uniform solution by moving the issue to the federal level. But his sugges-

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FCC may be referee in caller ID dispute

continued from page 13

tions are not without controversy since the FCC might have to preempt state regulation of the service in order to establish a uniform system.

Leaving the regulation of caller ID to the states would not necessarily serve the public interest, Baer contends, because carriers with tremendous resources could put undue pressure on state regulators to accede to their requests. Baer also said it is only a matter of time until caller ID is offered on a long-haul basis anyway, placing it under FCC authority.

"Regulation of [caller ID] at the state level, with different rules applying in different states, would result in calls from the same party being subject to different and conflicting rules for delivery," Baer told the FCC.

States have taken vastly different approaches to the caller ID issue. For example, Bell Atlantic Corp. successfully won the right to provide caller ID with no blocking in New Jersey, Maryland, Virginia and West Virginia with virtually no resistance. However, Pennsylvania, which is also in Bell Atlantic's service region, has barred caller ID, claiming it violates the state's wiretap laws and state constitutional provisions on privacy.

BellSouth Corp. has a similar mixed bag in its region. The carrier has filed tariffs to offer caller ID in five states but has won permission only in Tennessee. The carrier is awaiting approval in Alabama, Florida, Georgia, North Carolina and South Carolina.

In North Carolina, however, the state's attorney general recently issued an opinion saying he believes caller ID violates North Carolina's wiretap laws. In South Carolina, caller ID was approved but the state's consumer advocate asked for the service to be put on hold after Pennsylvania barred the service.

Pacific Telesis Group and US West, Inc. are at the other end of the spectrum. Pacific Telesis has not rolled out caller ID but is planning to offer the service in Los Angeles and San Francisco in 1991.

> Carriers with tremendous resources could put undue pressure on state regulators to accede to their requests.
>
> ▲▲▲

Because of a state law that took effect Jan. 1, the company must offer call blocking free of charge. Pacific Telesis supported that bill.

US West announced that its first market trial of caller ID will be held in Omaha, Neb., through the end of the year with call blocking offered free of charge.

Baer has asked the FCC to open a formal proceeding to examine his proposal and to suspend current caller ID services until the issue is resolved. The FCC is considering comments from interested parties on Baer's plan. ◘

US Sprint to keep aggregation in line

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try" calling. In the next few months, US Sprint will add four Global FON partners, long-haul carriers in foreign countries, to bring the total to seven. The additions will allow US Sprint to serve several locations in the Caribbean.

US Sprint has the potential to leapfrog the competition in the crucial area of "third country" calling, which is the ability to terminate calls to someplace other than the U.S. when calling from a foreign country. The Global FON alliance allows cardholders to originate calls from any of the seven Global FON Alliance countries and to connect to any country in the world with which the originating carrier has billing agreements.

By comparison, AT&T SDN customers can call third countries only from the U.S., the U.K. and Japan. MCI does not offer third country calling through its Vnet card.

Watch those 900 applications

You never know what you get with 900 services; sometimes the most innocent actions can turn into nightmares. Ask *The Star*. Earlier this year, it ran a 900 number that let readers phone in to register their opinion of the pop group, New Kids on the Block. *USA Today* did the same.

In March, the band filed suit against the papers claiming trademark infringement and violation of the right of privacy, which includes right to control publicity. The band said it believed it had rights to royalties from the 900 calls since they were revenue-generating programs. As such, they should not be differentiated from selling T-shirts or other paraphernalia, which are covered by trademark protection laws.

Both *The Star* and *USA Today* are arguing that the 900 program was a news gathering tool protected by the First Amendment. While the two publications have the luxury of claiming the First Amendment defense, most other firms cannot. Companies looking to launch 900 applications should think about the content of the program to determine if anyone might own copyright or trademark privileges to future revenues. This can mean sports figures, corporations and the like.

The outcome of this trial could have some substantial repercussions on 900 programming.

Geography lesson

One of my friends runs an island-hopper airline that serves many islands in the Caribbean. He is an AT&T customer and recently received a solicitation call from AT&T to take part in its Reach Out World plan based on his Caribbean usage.

With more than $1,200 worth of calls monthly from his Virginia home to the Caribbean, he was certainly interested in any available discounts.

He became confused when the AT&T representative said that none of the countries to which he called was covered by this new plan. In fact, the only Caribbean country included was the Bahamas, which legally is not in the Caribbean.

He sarcastically asked the representative, "If you are going to throw the Bahamas into the Caribbean, why don't you throw Iceland and Greenland in there too?" The response was, "Well it's cold in those countries." So much for sophisticated marketing. ◘

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DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

In an effort to attract more customers, Mobil Oil Corp. recently decided to accept two million automated teller machine cards issued by Electronic Data Systems Corp.'s Instant Teller network. Those cards will now be accepted by Mobil's point-of-sale network at 5,200 stations in 24 states and brings the number of potential customers for the network to 60 million.

Data Packets

IBM recently announced a 4% price increase for many of its hardware and software products, effective Jan. 1, 1991. Included in the price hike is the 3745 Model 210 Communication Controller, the Application System/400 9406 Models B35, B40, B70, P35 and P45 and some RISC System/6000s. The price increase does not apply to any product or price changes announced after June 1 this year.

Intel Corp.'s Personal Computer Enhancement Operation recently introduced a CCITT V.32-compliant modem priced under $1,000.

The 9600EX is a stand-alone modem supporting transmission speeds up to 9.6K bit/sec in full-duplex over dial-up or two-wire leased lines. In addition to the V.32 standard, the modem also supports CCITT's V.42 error checking and V.42bis data compression standards.

The 9600EX supports fall-back rates of 4.8K, 2,400, 1,200 and 300 bit/sec. It comes in two versions: one for IBM Personal Computers and one for Apple Computer, Inc. Macintoshes. The Personal Computer version costs $799, while the Macintosh version costs $819.

Calif. trials ATM-like net to speed license renewals

Motorists will be able to take driving test on-line.

By Jim Brown
Senior Editor

SACRAMENTO, Calif. — The California Department of Motor Vehicles this fall will test a network of ATM-like terminals that will let drivers access the department's host processor to quickly renew their licenses on-line.

The interactive Self-Service Driver's License Renewal Prototype terminal will be used to administer and score an electronic version of the Motor Vehicles Department's written driver's license renewal test. Residents who pass the test will be able to update their license information and pay the $10 fee for renewal at the terminal by using a credit card.

The department is testing the network terminals as part of its plan to speed driver's license renewals and shorten waiting lines in its 175 offices across the state. Department officials say that if the project is a success, the agency could avoid hiring additional staff to process an expected growth in renewals.

“California's population is increasing by leaps and bounds,” said Lisa Ito, a Motor Vehicles Department computer analyst and project leader for the prototype terminal. “There are just more and more people, and we don't have the staff. So instead of throwing more staff at the problem or building more offices, we're looking at other ways to process the information. This is one of them.”

The Department of Motor Vehicles processes 10 million license transactions annually and expects that number to grow by 8% a year. The state currently has 19.5 million licensed drivers.

The pilot project is aimed at those drivers who haven't taken California's mandatory written test within the previous 12 years. Motorists who pass the test can then renew their licenses for three successive four-year periods. Even if they have taken the test within the previous 12 years, those convicted of traffic violations such as speeding or drunk-

(continued on page 16)

The DEC, StrataCom team lands another T-1 net deal

By Paul Desmond
Senior Editor

LOUISVILLE, Ky. — Baptist Hospitals, Inc. has signed up Digital Equipment Corp and StrataCom, Inc. to build a T-1 network to replace a leased line net.

The network will give four hospitals access to a VAXcluster here and enable users to support the transmission of voice and data over the net.

The contract represents the latest in a series of orders that DEC and StrataCom have won since announcing their joint marketing agreement in May 1989.

The two companies also recently announced that PSI Energy, Inc., an electric company in Plainfield, Ind., has contracted with them to build a T-1 net. Along with previously announced contracts for *The Boston Globe* and Miles, Inc., the DEC/StrataCom team has scored at least four contracts.

Quantum leap

Baptist Hospitals is building a T-1 net, based on StrataCom's IPX FastPacket T-1 multiplexers, to replace a network of leased point-to-point 9.6K bit/sec lines that currently provide terminal access to host computers here. The T-1 net, scheduled to be operational in November, will support data, voice and eventually video.

“I feel like we're making a quantum leap in data communications technology,” said Rand Eller, director of information services at Baptist Hospitals.

Today, information from hospital computers in the data center is transmitted via multiple point-to-point 9.6K bit/sec circuits to hospitals in Corbin, Lexington and Paducah, Ky., Eller said. The existing net is configured in a star topology in which the hospital headquarters serves as a central hub.

A Honeywell Bull, Inc. mainframe at the data center supports an array of applications, including medical records, patient registration and files containing everything from prescriptions to doctors' orders.

Due to increasing transaction volume, the Honeywell system is being replaced by a more powerful cluster of four DEC VAX 6000s and the low-speed lines are being

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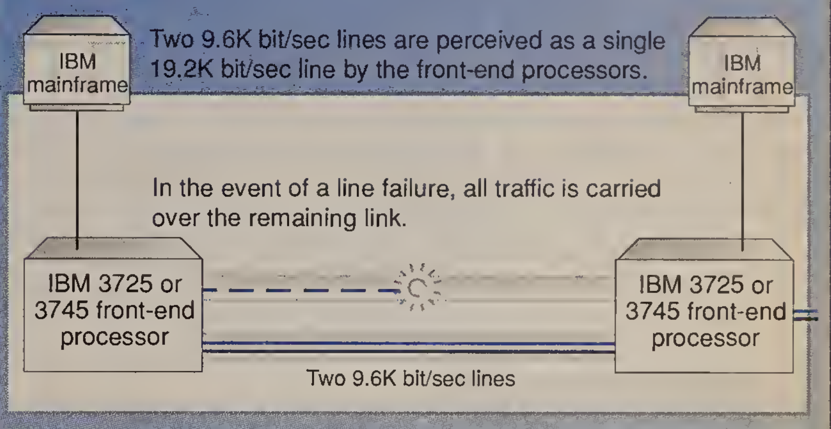
Service firm safeguards links to customers

Combines SNA feature with multiple data paths to ensure uptime


IBM mainframe
Two 9.6K bit/sec lines are perceived as a single 19.2K bit/sec line by the front-end processors.
IBM mainframe
In the event of a line failure, all traffic is carried over the remaining link.
IBM 3725 or 3745 front-end processor
IBM 3725 or 3745 front-end processor
Two 9.6K bit/sec lines

SEI Corp. is using an SNA feature known as SNA Network Interconnection (SNI), combined with route diversity in its leased lines, to keep its clients' networks up and running in the event of line failures.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: SEI CORP., WAYNE, PA.

Firm guards links to customers with SNI

Using multiple lines, diverse routing and SNA feature, SEI is able to weather almost any outage.

By Paul Desmond
Senior Editor

WAYNE, Pa. — SEI Corp., a financial services company and service bureau here, is using a combination of diverse circuit routes and IBM SNA features to ensure maximum uptime on links to its clients' SNA networks.

An IBM Systems Network Architecture feature known as SNA Network Interconnection (SNI) has proven to be a valuable insurance policy against line failures between SEI front-end processors and those of its customers.

SNI, combined with the use of multiple diverse circuit routes, enables SEI customers to survive a link failure without losing SNA sessions and with only a minimal increase in response time.

The strategy has allowed SEI to weather numerous AT&T line failures, including one in Chicago last July that knocked out about 40 of SEI's 300 circuits, said Russ Miller, formerly manager of marketing support at SEI.

SEI uses the strategy chiefly to support its Trust 3000 application, a homegrown accounting system for trust departments and banks that it runs on a collection of IBM and Amdahl Corp. 3090 class mainframes. About 300 financial institutions at 625 locations nationwide tie into the data center here to access the application.

Some of those clients access SEI by tying cluster controllers into one of eight IBM 3725 front ends. SNI does not apply to those clients because it requires a link between Network Control Programs (NCP) running on IBM front-end processors. SNI is a feature of IBM's mainframe VTAM software as well as NCP, Miller said.

Those clients that have their own SNA networks but want to establish a link to SEI's net to access Trust 3000 use SNI by running at least two circuits from one of their front ends to one of SEI's, Miller said.

NCP treats the multiple circuits as a single logical circuit so if a user connects two 9.6K bit/sec lines to a front end, for example, NCP treats that as a single 19.2K bit/sec link, he said.

“The beauty of all this is that if one circuit goes down, there's never a drop in any session,” Miller said. “As long as one circuit remains, the two front-end processors are still in contact.

“We've had situations where three out of four links will go down and the end user doesn't know except for maybe a slight degradation in response time,” he said.

A key to successful implementation of SNI is getting the carrier, which in SEI's case is AT&T, to guarantee diverse routes when configuring links between front-end processors.

If they exist, and they usually do, Miller said users can get diverse routes under any AT&T tariff.

“We've never been in a situation where diversity hasn't worked,” he said. For instance, in the July 15 outage in Chicago, “we lost approximately 40 circuits out of the 300 in our network, but none of the clients who

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Firm guards links to customers with SNI

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used SNI were affected,'' Miller said.

Another fringe benefit of SNI is it allows better bandwidth utilization than a cluster controller link to a front end or mainframe.

Users of Trust 3000 typically run three kinds of data between their sites and SEI. One is the interactive terminal traffic used during the day, and another is small reports that are printed on controller-attached printers. Both of those applications can be supported over a link between a cluster controller and a front end.

But Trust 3000 users also get large reports, which require SEI to either run the print job and ship the copy, ship tapes of the job to its client or run a separate NJE link to a bulk printer at the user site. Under the latter scenario, if one of the circuits fails, the client loses whatever sessions were supported.

With SNI, there are at least two circuits operating at all times. At night, when interactive traffic is at a minimum, extra bandwidth is available to support the bulk print application. And a single link failure would not bring down any applications.

"Having this kind of setup where you don't lose a session and the client doesn't see anything blink has made a big difference for SEI's operation,'' Miller said. "I'm sure if other people were familiar with this kind of linkage, they would be able to use it to their advantage.'' ◻

Calif. ATM-like net to speed renewals

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en driving, as well as those who have been in a traffic accident at any time during the previous four years, must also take the test. Drivers who are not required to take the test can renew their licenses by mail.

For the pilot, the department will install NCR Corp. 5682 self-service terminals in its Los Angeles, San Francisco and Sacramento offices. The terminals will be linked via the Motor Vehicles Department's existing network to an IBM mainframe that manages access to a driver's license data base. Eventually, the terminal will also be linked to MasterCard International, Inc.'s and Visa International, Inc.'s credit card authorization networks.

The terminal, which consists of a touchscreen microcomputer, a video disc, a color monitor and three printers, appears to an on-site IBM Series/1 minicomputer as either a directly attached IBM 3101 asynchronous terminal or an IBM 3174 cluster controller. The Series/1s are linked to the data center here via multidrop 9.6K bit/sec leased lines.

At the terminal, drivers are prompted to enter their driver's license number and birth date. The terminal uses this information to download data about the driver from the host. Drivers must then insert a Visa or MasterCard to pay the renewal fee. One of the printers is used to print a credit card receipt. Once Visa or MasterCard authorizes the charge, the terminal displays the driver's personal data such as address, height and weight. Drivers can make any needed changes to that data.

Video test

The terminal then plays between five and 18 videotaped traffic scenes. At the end of each scene, drivers are presented with a list of alternatives and asked to identify which best describes the proper action to take. When the test is completed, the terminal determines whether the driver passed or failed, uploads the information to the host and uses the second printer to produce a copy for the driver.

The terminal keeps a copy of transactions in a journal and can print out a copy for administrative purposes using the last of the three printers.

Once the transaction is complete, drivers have their picture taken at another area in the office and use the test score receipt as a temporary license. The department then mails the drivers their license later.

If deployed following completion of the pilot test early next year, the terminal could be enhanced to process vehicle registrations. It could also be used by other state agencies for such procedures as issuing fishing licenses, changing addresses on tax records or registering to vote. ◻

DEC, StrataCom land another T-1 net deal

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replaced with T-1s that will link the same sites in a ring topology.

The hospital opted for StrataCom's IPX in part because of the switch's ability to dynamically allocate bandwidth among different data, voice and video applications. That will be important since, in addition to data, Baptist Hospitals will use its new T-1 net to link private branch exchanges at each of its four hospitals, in effect, creating its first private voice network.

Further down the road, Baptist Hospitals plans to use the T-1 net to support videoconferencing, Eller said.

In its own image

PSI Energy will use its eight-node T-1 net primarily to support an imaging application, said Steve Oschman, PSI's manager of network operation services.

With the application, PSI can ship maps of its electrical distribution network from its DEC VAXes via 256K bit/sec channels to personal computers at field offices where the images are used to determine electrical distribution paths for new customers, Oschman said. That will cut transmission time from more than 12 minutes per map using 19.2K bit/sec lines to less than four minutes, he said. ◻

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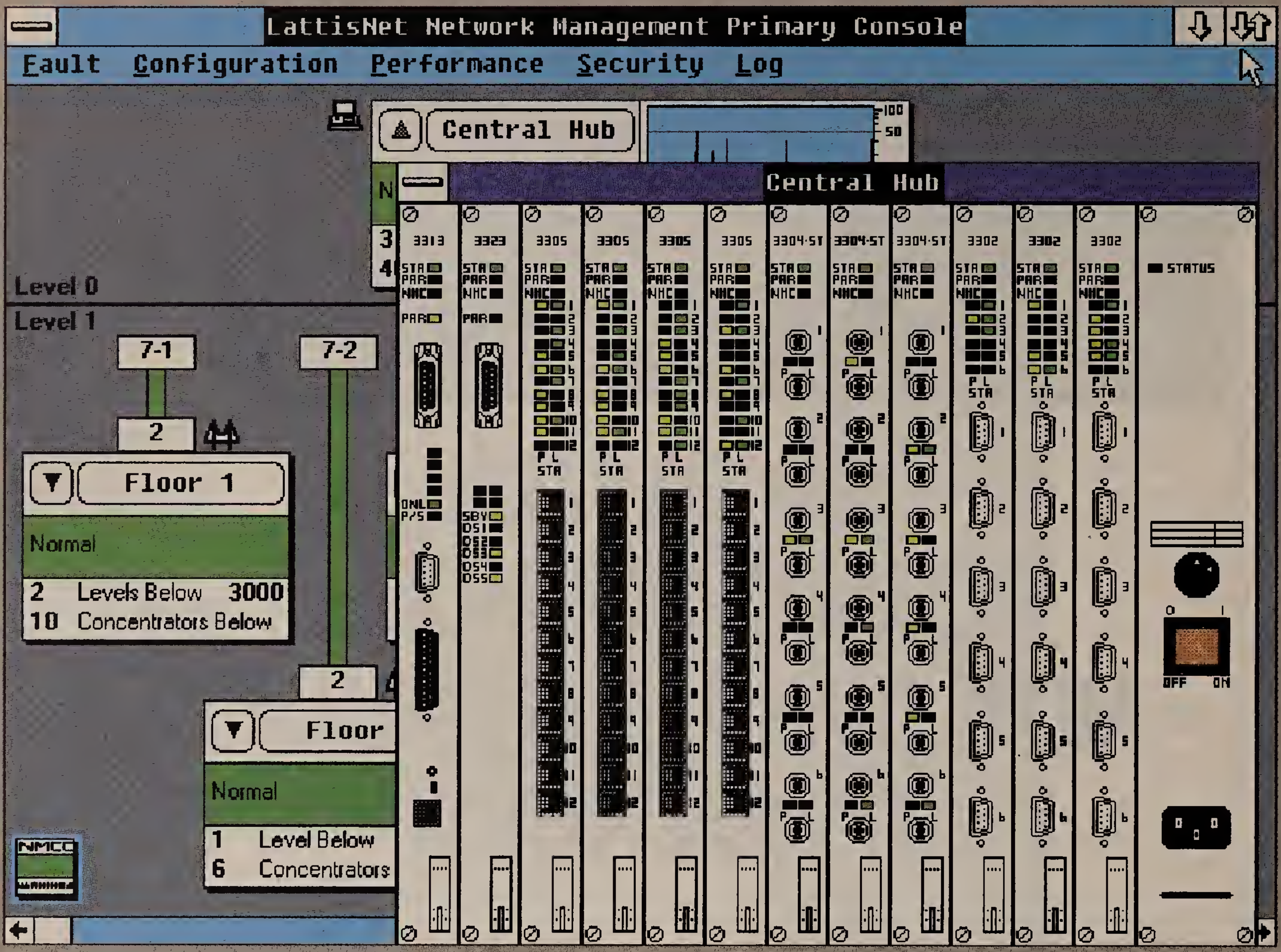

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Worth Noting

"The issue of how much users will save using unshielded twisted-pair wire instead of shielded twisted pair has been overblown because the installation costs are comparable. The biggest cost savings associated with [unshielded twisted pair] is using existing wiring and not having to pull new cable."

Mary Modahl
LAN analyst
Forrester Research, Inc.
Cambridge, Mass.

Netnotes

Abletec, a division of **Able Technologies, Inc.,** recently introduced a local-area network server, a diskless workstation and an Ethernet interface.

The new Abletec File Server/386 is based on a 33-MHz Intel Corp. 80386 microprocessor and supports 4M bytes of system memory, expandable to 64M bytes. Disk capacity ranges from 40M bytes to 650M bytes.

The server comes configured with DOS but can also run OS/2 and Unix. It has eight expansion slots and is designed for 30 or fewer users when running Novell, Inc.'s NetWare LAN operating system. The file server, which only supports Ethernet, is priced at $3,995.

The new diskless workstation, the Abletec LANStation-2, is a DOS-based device with an Intel Corp. 80286 microprocessor that can also be expanded to support OS/2 and Unix. It is available in 12-, 16- and 20-MHz versions and offers 1M byte of main memory, expandable to 8M bytes. The diskless workstation costs $1,495.

Finally, the company unveiled the AE-2000, a 16-bit Ethernet interface for ma-

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NetWare-based releases to take center stage at show

NetWorld '90 to feature a variety of new offerings.

By Laura DiDio
Senior Editor

DALLAS — The NetWorld '90 trade show, which kicks off here today, will host the introduction of a cornucopia of networking products, including new data base servers, plastic fiber LAN technology, internetworking bridges and routers, and enhanced groupware software.

While Novell, Inc. no longer controls the NetWorld show — it sold the show's rights two years ago — much of the new product activity still centers on NetWare, the firm's market-leading local-area network operating system.

For example, two of the top data base software vendors, Informix Corp. and Oracle Corp., are expected to introduce data base servers for Novell's NetWare 386, a sign that client/server computing is catching on among personal computer LAN users, said Richard Finkelstein, president of Performance Computing, Inc., a Chicago consultancy.

"PC LAN users are increasing both the size and scope of their nets, and data base servers are the cornerstone of these larger, more powerful LANs," he said.

Novell's chief rival, 3Com Corp., which has eschewed most trade shows in recent years, will make its first appearance at this NetWorld. Ironically, 3Com, which helped Microsoft Corp. in developing NetWare's primary rival, OS/2 LAN Manager, will be demonstrating 3+Open Connection for NetWare, which will enable personal computers running 3+Open client software to access 3+Open and NetWare servers ("3Com moves to open net product line," *NW,* Sept. 3).

Spokesmen for Digital Equipment Corp. and Compaq Computer Corp. said they have no product announcements planned, although DEC and IBM executives will be on hand to talk about LAN products. DEC will demonstrate its recently introduced 100M bit/sec Fiber Distributed Data Interface products, and IBM will show off its just-released intelligent 8230 Token-Ring Network Controlled Network Access Unit and preview users on forthcoming FDDI offerings.

For its part, AT&T is expected to bolster its network and systems management product line. AT&T will introduce a network management software package

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Proteon adds support for fiber optics to IWC hub

By Laura DiDio
Senior Editor

WESTBOROUGH, Mass. — Proteon, Inc. recently enhanced its Series 70 Intelligent Wire Center (IWC) to support fiber-optic wiring and upgraded its network management software to support 16M bit/sec token-ring nets.

The Series 70 IWC, unveiled a year ago, is a token-ring hub that can be used with the company's 4M, 10M and 16M bit/sec ProNET token-ring local-area network products in a star topology.

Each Series 70 can support a maximum of eight token-ring workstations, and multiple Series 70s can be linked to support 260 workstations at distances up to 330 feet between the wire center and workstations. The maximum number of workstation connections and distance between the wire center and workstation depends on the type of media used.

The newly added support for fiber-optic cable is targeted at users that want to build 4M or 16M bit/sec campuswide fiber-optic backbones, according to Warren Farr, Proteon's Series 70 IWC product marketing manager.

Previously, the Series 70 supported only shielded and unshielded twisted-pair media.

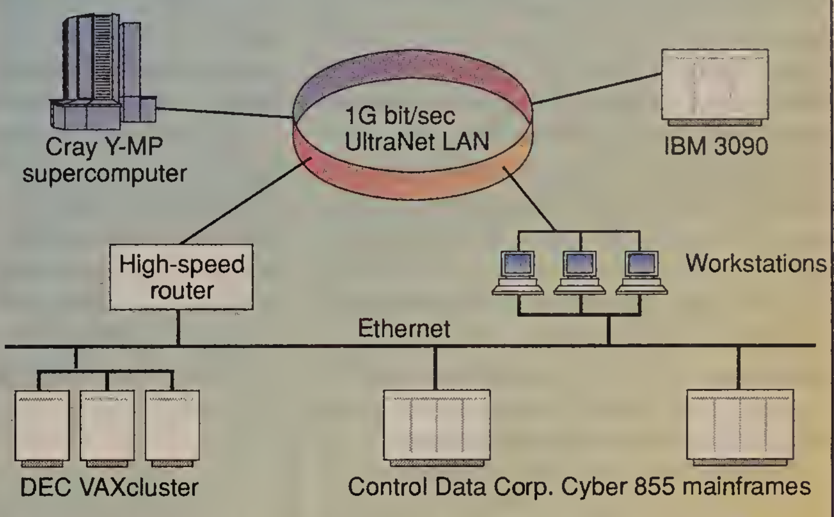
The so-called Series 70 Fiber Link Pair consists of two circuit boards that plug directly into the existing Series 70 IWC chassis. The Series 70 Fiber Link Pair enables users to link remote token-ring LANs located a maximum of 1.8 miles apart.

The Fiber Link Pair, which supports standard 62.5 micron multimode fiber, provides two fiber-optic links between Series 70 IWCs. The remaining eight ports in the Series 70 are dedicated to supporting shielded or unshielded twisted-pair workstation connections, Farr said.

The Fiber Link Pair can be purchased for $1,995 as a separate upgrade for existing Series 70 users, or it can be preconfigured with the fiber-optic option for new customers, Farr said.

(continued on page 20)

Ultrafast net helps predict weather



A European weather forecasting service plans to install a 1G bit/sec Ultra Network Technologies, Inc. UltraNet LAN to support the massive amounts of data its Cray Research, Inc. supercomputer produces when calculating global weather foreceasts.

SOURCE: EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS, READING, ENGLAND
GRAPHIC BY SUSAN J. CHAMPENY

Weather service to get high-speed LAN

European weather center to implement 1G bit/sec UltraNet to support immense supercomputer I/O.

By Paul Desmond
Senior Editor

READING, England — A European weather forecasting service here plans to install a 1G bit/sec UltraNet local-area network from Ultra Network Technologies, Inc. later this year. The network will link high-powered mainframes and workstations used to process the reams of data needed to make long-term weather predictions.

The European Centre for Medium-Range Weather Forecasts (ECMWF) will use the UltraNet to link a Cray Research, Inc. supercomputer with an IBM mainframe acting as a file server along with an assortment of other mainframes, minicomputers and workstations.

The net will initially be used to support a software development project aimed at producing a file-transfer facility capable of shipping large files between computers from different vendors.

Eventually, it will replace a 50M bit/sec LAN that currently links the Cray, IBM and other machines, said Geerd Hoffmann, head of ECMWF's computer division.

UltraNet's 1G bit/sec bandwidth, the equivalent of 100 Ethernets, will be required to support the massive files produced by the center's Cray Y-MP supercomputer, he said. The Y-MP is running in parallel with a smaller Cray X-MP that is being phased out.

The ECMWF produces global 10-day weather forecasts and distributes them to weather service bureaus at 18 member states in Europe, Hoffmann said. It also acts as the European research center for atmospheric sciences.

Most of the ECMWF's work is based on a numerical simulation model of the earth's atmosphere, Hoffmann explained. The model consists of a grid with hundreds of thousands of points that represent locations in the atmosphere. Weather is predicted by assigning one of seven or more values to each point every 15 minutes.

"That means a lot of computations," Hoffmann said. "And that's why you need these huge computers and these endless amounts of data."

> The computations processed on the Cray supercomputers result in massive files.
>
> ▲▲▲

The computations processed on the Cray supercomputers result in massive files that amount to about 13G bytes of data per day on the X-MP, a figure expected to grow to 30G bytes a day when the Y-MP becomes fully operational next year, he said.

The ECMWF also collects some 30M bytes of data per day from approximately 155 national weather services worldwide via two 64K bit/sec links to the Global Telecommunications System (GTS), a network that supports

(continued on page 21)

Proteon adds support for fiber optics

continued from page 19

The Series 70 IWC differs from the comparable IBM Media Access Unit (MAU), the 8220 4/16 Fiber Repeater, because it integrates fiber-optic support directly into the Series 70.

By contrast, Farr said, IBM's $3,090 fiber-optic offering is a separate external device that attaches to the MAU.

As users install larger networks, the demand for multiple media support within a single Series 70 IWC has increased, Farr said.

Doug Gold, director of communications research at International Data Corp., a consultancy in Framingham, Mass., said fiber-optic cable already accounts for more than 30% of new cable installations.

Proteon's Farr agreed. "When we first introduced the Series 70 IWC in the summer of 1989, the typical customer had two or three token-ring nets with fewer than 20 nodes attached to each one," Farr said. "But in just the past year, the average midsize user's token-ring installation has grown to five or six nets comprising 35 to 40 nodes on each LAN. And in most cases, users want to link those [shielded and unshielded twisted-pair] wired desktop personal computers to a fiber backbone."

The Series 70 Fiber Link Pair boards are scheduled to ship next month.

In related news, Proteon introduced an enhancement to its current TokenVIEW network management software that enables network administrators to troubleshoot 16M bit/sec token-ring fiber-optic backbones from a central site, according to Kumar Shah, Proteon's senior product manager for the TokenVIEW product line.

The existing TokenVIEW network management package supports 4M, 10M and 16M bit/sec token-ring nets built with shielded and unshielded twisted-pair wire, but not fiber-optic cable, Shah said.

The new TokenVIEW Plus software package enables network administrators to locate, isolate and disable any faulty device on 16M bit/sec IEEE 802.5-compliant fiber networks from the net manager's workstation, Shah said.

TokenVIEW Plus integrates both inband network monitoring and outband network management features for physical-layer management of token-ring LANs.

The inband monitoring capability receives physical network statistics such as the number and size of the data packet frames and alerts the network administrator to such problems as data transmission errors, faulty nodes, broadcast storms or potential faulty nodes.

The outband management feature gives network administrators the ability to isolate and disable faulty nodes and cabling anywhere on the network. The outband feature also lets network administrators restore network operations from their workstations.

In contrast, most other competing token-ring net management software packages only offer inband monitoring, Shah claimed.

"This means that the network administrator can detect network failures but can't do anything to correct physical-layer LAN problems without actually being on site," Shah said.."

"With TokenVIEW Plus, users can typically correct the majority of physical-layer token-ring LAN problems in five minutes or less," Shah said.

TokenVIEW Plus will ship in October. Site licenses range from $1,995 for three token-ring nets to $9,995 for 64 token-ring licenses. ◼

Releases to take center stage at show

continued from page 19

that will enable administrators to troubleshoot and monitor remote Transmission Control Protocol/Internet Protocol-based LANs from a central site, according to sources within the company who requested anonymity.

In addition, AT&T will announce customized LAN service, support and maintenance arrangements. These include an Information Asset Services package that will aid users in crisis management planning.

"Our NetWorld offerings will help users reduce the complexity of network and systems management, and ensure maximum network uptime," the AT&T source said.

Spokesmen for Codenoll Technology Corp. and General Motors Corp. said the two firms will announce jointly developed plastic fiber-optic LAN technology at NetWorld, although the companies declined to provide any additional information regarding the announcement.

Halley Systems, Inc. is expected to introduce the ConnectLAN 300 Token-Ring Bridge family, which includes three source routing and physical-layer bridges for 4M and 16M bit/sec token-ring networks.

The ConnectLAN 302 connects two local 4M/16M bit/sec token-ring nets and sells for $6,995. The ConnectLAN 311 links two remote 4M/16M bit/sec token-ring nets and costs $8,295. The third product, the ConnectLAN 331, interconnects three remote 4M/16M bit/sec token-ring networks and is priced at $11,500.

The new bridges can be connected via leased lines ranging in speed from 9.6K bit/sec to 7M bit/sec, or more than four times the 1.544M bit/sec speed of a T-1 line. The new Halley bridges are protocol-independent and support Novell NetWare, Banyan Systems, Inc.'s VINES and IBM's PC LAN Server. In the future, the Halley bridges will support Microsoft's OS/2 LAN Manager "as soon as Microsoft releases the source routing drivers," said Bruce MacAloney, Halley's product marketing manager. ◼

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Netnotes

continued from page 19

chines based on the Industry Standard Architecture personal computer bus. It supports both thick- and thin-wire Ethernet cabling and costs $325.

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Abletec can be contacted by writing to 46971 Fremont Blvd., Fremont, Calif. 94538, or by calling (415) 659-1544.

Tiara Computer Systems, Inc. and **BICC Data Networks, Inc.** recently jumped into the Ethernet interface price war by cutting their board prices 25% and 35%, respectively.

Tiara's LanCard/E*MC, a 16-bit card for IBM Personal System/2 computers, has been reduced 25%, from $595 to $445. Tiara also lowered prices on two other boards. The LANCard/E*AT, a 16-bit card for IBM AT systems has been reduced 15%, from $500 to $425, and the LanCard/E*PC 10BT, an 8-bit adapter that supports the IEEE 10BaseT draft standard, has been cut about 13%, from $450 to $395. BICC, meanwhile, cut its comparable 8-bit Model 4101-0 10BaseT Ethernet adapter to $375, down from $495, a price cut of about 25%. BICC also dropped the price of its 16-bit PS/2 MC ThinNet/AUI card 37% to $375, down from $595.

For more information, contact Tiara Computer Systems at 1091 Shoreline Blvd., Mountain View, Calif. 94043, or call (415) 965-1700. BICC can be reached at 1800 W. Park Drive, Westborough, Mass. 01581, or call (508) 898-2422.

A scant 10 days after **3Com Corp.** officials said the company would not lower Ethernet adapter prices in response to recent reductions by competitors, the company changed its tack and cut the cost of its Micro Channel Architecture (MCA) card by as much as 16%.

Citing recent design and manufacturing changes, 3Com lowered the price of its EtherLink/MC adapter for systems based on the IBM MCA from $495 to $425. The cost of EtherLink/MC in a five-pack configuration is now $1,875, down from $2,225, a decrease of $70 per card.

A 3Com spokesman said the EtherLink/MC adapter is covered by the company's lifetime warranty. ◘

Weather service to get high-speed LAN

continued from page 19

communications among those services.

The GTS links are controlled by Digital Equipment Corp. VAX minicomputers, which also support wide-area network links — based on either DECnet or a homegrown protocol — to the ECMWF's 18 members. Another 300M bytes of weather data is shipped daily by this route to those 18 members. Altogether, seven VAXes are linked in a VAXcluster to a multiprotocol Ethernet network that runs throughout ECMWF headquarters, Hoffmann said.

The Ethernet also supports 15 Sun Microsystems, Inc. workstations linked using the Transmission Control Protocol/Internet Protocol. The Sun workstations are used for program development and graphics-based applications for viewing and tailoring weather maps.

The Ethernet also links numerous personal computers under Novell, Inc.'s NetWare net operating system. These are used for application development, graphics and office automation applications.

Today, the Ethernet is bridged via a Control Data Corp. Cyber 855 mainframe running NOS/VE to a CDC Loosely Coupled Network (LCN) — a 50M bit/sec LAN that links two Cyber 855s, an IBM 3090, the VAXes and the Cray X-MP.

The Cray Y-MP, which is linked via Ethernet to the VAXes, has one channel connection to each of the Cybers and is linked to the 3090 via three parallel channel connections.

When it is first installed, the UltraNet will connect the Cray Y-MP, IBM 3090 and the Sun workstations. That configuration will support development of software that will support file transfers among the machines used by ECMWF. As a result, by 1992, they will all be able to share the 1G bit/sec TCP/IP-based UltraNet, which will have replaced the 50M bit/sec LCN by then (see graphic, page 19).

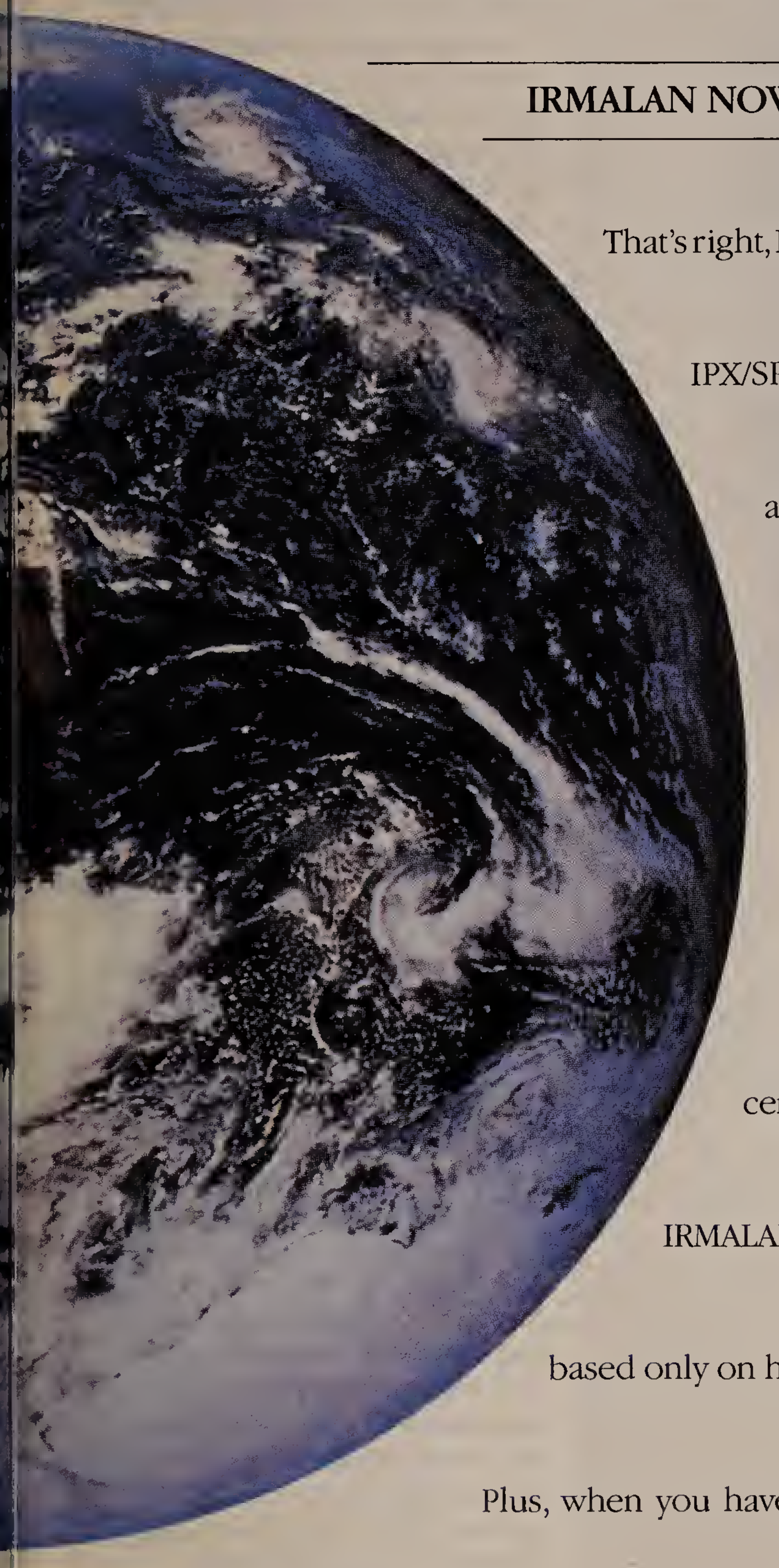
Initially, however, the UltraNet will support only about half its potential bandwidth because ECMWF's mainframes are not yet outfitted with the channel equipment needed to link to the gigabit LAN. In addition, the slower speed will be sufficient through 1991 for the software development project the UltraNet is initially intended to support.

According to Hoffmann, the software under development is a TCP/IP-based file-transfer application that can retrieve and send files from DataTree, a file management package that runs on the 3090 under MVS to let the mainframe act as a file server. DataTree, from the Distributed Computing Solutions Division (DISCOS) of General Atomics, is a hierarchical filing system that keeps often-used files on online disks and relegates other files to IBM's Mass Storage System or cartridge tapes, Hoffmann explained.

ECMWF has to develop its own file-transfer mechanism because DataTree is a hierarchical file system and its files cannot be accessed via standard MVS calls or via the TCP/IP File Transfer Protocol.

The 3090 is used to store all the data ECMWF needs to keep, such as the files produced four times each day that represent the actual state of the atmosphere at those times. It also stores researchers' files and three years' worth of forecasts.

DataTree ships a requested file to a user's computer and, if the user makes modifications to it, replaces the old file with the new version. ◘



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Worth Noting

In a recent Index Group survey of nearly 250 senior information systems (IS) managers with U.S. firms, almost two-thirds of the respondents said it is getting easier to align IS and corporate goals.

Association Watch

The Communications Managers Association (CMA) will hold its annual fall conference Oct. 21 to 24 at the New York Hilton.

Telecom 90 will feature more than 30 educational sessions and more than 150 vendors exhibiting their products and services at the hotel.

CMA, which is composed of network managers from more than 225 large U.S. companies, is geared toward keeping members informed about the latest changes and developments in the telecommunications industry.

The conference costs $325 for CMA members and $375 for nonmembers. To register, call (800) 262-3976.

The **Tele-Communications Association, Inc. (TCA)** will hold its annual conference Sept. 24 to 29 at the San Diego Convention Center.

This year's meeting, titled "Decade of Decisions: Today's Applications, Tomorrow's Opportunities," will explore the changes that the decade of the 1990s will bring to the telecommunications industry.

The conference will feature more than 330 exhibitors as well as 40 seminars ranging from developments in telecommunications technology to stress management.

William McGowan, chairman and chief executive officer of MCI Communications Corp., will be the keynote speaker. Though access to seminars is now closed, registration for exhibits is still available. To register, call TCA at (818) 967-9411. ◘

Managers selective about attending net conferences

Most say they go to fewer shows for fewer days.

By Wayne Eckerson
Senior Writer

Tight travel budgets and busy work schedules are forcing net managers to be more judicious in choosing which conferences and seminars to attend this year.

In order to economize, many have decided to limit their attendance to one or two conferences held in their region or city, according to net managers interviewed by *Network World*. Many of these managers agreed that conferences offering a broad range of tutorial sessions and vendor exhibits enable them to get the most for their money.

"With the cost of food, housing and registration fees, it's getting harder to justify attending more than one or two conferences a year," said Jeff Lipton, director of telecommunications at the University of Colorado at Boulder.

"Besides, work doesn't go away when you leave for a few days," he said. "It hits you twice as hard when you return."

In an effort to stretch tight travel budgets and save time, the information systems (IS) department at semiconductor maker Harris Corp. uses teamwork to get the most out of conference visits.

The IS department usually selects one person to act as a departmental "representative" when attending a conference. Before leaving, this person finds out what information each member of the department would like to obtain from the conference.

"By sending one person to represent the entire staff's interests, we feel we can get the biggest bang for the buck," said Jim Odom, manager of systems and support for Harris in Melbourne, Fla.

Odom said staff members usually attend conferences that are at least three or four days long.

"It's hardly worth the time and effort to fly someone to a conference that lasts less than several days," he said.

However, other network managers said busy work schedules leave them little time — usually a day or less — to spend at conferences.

Steve Wood, telecommunications manager at Hambrecht & Quist, Inc. in San Francisco, said he goes to the Tele-Communications Association, Inc.'s (TCA)

(continued on page 26)

EXECUTIVE BRIEFS

Pushing the top. Disaster recovery managers and executives in charge of systems planning and network architectures last year received the biggest salary increases among top information systems (IS) executives. That's according to a recent survey of 864 senior IS executives at 31 large U.S. companies that was conducted by Edward Perlin Associates, Inc., a management consulting firm in New York.

The average base salary for disaster recovery managers increased last year by 30% to $91,200. The average base salary for heads of systems planning and network architecture increased by about 27% to $115,000.

These increases far exceed the 9.4% average salary increase received by executives in 18 other IS positions. For example, heads of telecommunications services made an average of $104,600, a 9% increase from the year before, while managers of domestic network planning took home $75,800 in base pay for a 3.5% annual increase.

Waste not, want not. One way to improve the productivity of U.S. businesses is to cut down on the time executives waste in unnecessary meetings, according to a new survey.

U.S. executives spend an average of 72 minutes each day attending unnecessary meetings, 32 minutes reading and writing unnecessary memos and 15 minutes waiting on hold on the telephone. The survey, which was sponsored by Accountemps, a temporary personnel services firm in Menlo Park, Calif., was based on interviews with 200 executives in Fortune 1,000 firms. ◘

Choosing a site

Net managers should get involved in selecting an office site to ensure that:

1. It has a sufficient number of twisted-pair outlets and a large enough entrance conduit for incoming phone cable.
2. It can support redundant lines to a central office, or microwave or fiber links directly to a long-distance carrier.
3. It isn't fed by aerial cable, which increases the risk of service disruption.
4. Heating and cooling systems aren't located above or near a network equipment room to avoid potential water damage.
5. The network equipment room has a separate cooling system, which is supported by an uninterruptible power supply.
6. Cable plans adhere to local building codes.

GRAPHIC BY SUSAN SLATER

A moving challenge for net managers

When a company relocates, network managers must be involved in every stage of the process.

By Wayne Eckerson
Senior Writer

Managing an office move can be a real test of a net manager's planning and leadership skills.

Relocating is a time-consuming and resource-draining endeavor that requires teamwork, flexibility and tremendous attention to detail, said managers and consultants interviewed by *Network World*.

Managers have to be involved in the relocation effort from the time of site selection to the move itself to ensure that new facilities can support the company's current and future networking needs, they said.

When moving to existing buildings, network staffers must explore — among other things — whether a building's electrical and cooling systems are adequate to support sophisticated communications equipment. They also must determine the nature and quality of inside wiring, as well as external telecommunications links, and study wiring closets and equipment rooms (see graphic).

With new buildings, net managers should play a major role in defining requirements for these facilities.

In both cases, the net staff must devise fail-safe plans to ensure that the relocation doesn't interrupt network operations or prevent users from accessing critical business applications.

Recognizing the Herculean effort required to carry out a major office move, some large companies hand off responsibility to outside consultants. While facilities relocation consultants aren't cheap, many companies would rather not divert staff resources from working on more strategic projects.

Bernie Schneider, a former telecommunications director for United Stationers, Inc., emphasized the importance of attending every meeting in which contractors determine the specifications for the office layout.

> It makes sense to spend a little more to be sure the facility will meet future requirements.

▲▲▲

"You don't need to be concerned with 90% of what goes on at these meetings, but the other 10% can seriously screw you up if you're not aware of it," Schneider said.

For example, most network equipment, such as T-1 multiplexers, requires individual 30-amp circuits, Schneider said. But many electrical contractors will put the equipment on 20-amp circuits that also power other pieces of office equipment.

Schneider added that it makes sense to spend a little more money up front to be sure the facility will adequately meet the company's future requirements.

(continued on page 26)

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A moving challenge for net managers

continued from page 23

"We've learned to run two sets of wires into every office and put extra in the ceiling because invariably, we end up using it. And it's much more expensive to pull cable later on," Schneider said.

According to Larry Liss, senior vice-president of operations and technology at Meritor Savings Bank in Philadelphia, the key to managing a relocation effort in-house is to develop detailed and comprehensive tactical plans.

Five years ago, the bank moved about 500 people and its data center to a former newspaper printing plant in the city. A steering committee of 12 to 15 managers from various departments, including information systems (IS), met regularly for a year and a half prior to the move.

Since the company's mainframe supported more than 2,000 terminals at 82 bank branches and 90 automated teller machines, it was critical that IS and network personnel minimize potential downtime, Liss said.

The steering committee set up a three-way network that linked the mainframe at the bank's old data center to a Sungard Recovery Services backup site and new mainframe at the new facility.

The three-way network allowed Meritor to thoroughly test the new systems while still running applications on the old machines, Liss said. If necessary, the bank could always fall back on the Sungard system until problems were resolved.

Outsourcing the move

Facilities relocation specialists claim they can save users the hassles of dealing with contractors and planning office space that will support the company's future technology requirements.

Several large New York firms, such as Merrill Lynch & Co., Inc. and Shearson Lehman Brothers, Inc., have used outside relocation consultants to orchestrate their larger office moves, some of which have involved thousands of workers.

Ken Kolakowski, vice-president of Walsh Lowe & Associates, Inc., a New York consulting firm specializing in facilities relocation, said many big firms will hire consultants so that technical staff people aren't divided between working on strategic projects and managing a move.

Despite the risks, many companies still manage relocation projects entirely in-house.

Gannett Co., for example, has a seven-person real estate department that coordinates offices moves and other projects for more than 100 newspapers, television stations and radio stations that the company owns. This group relies heavily on Gannett's telecommunications staff to specify communications requirements and to price new equipment for each move, according to Dinny White, vice-president of real estate at Gannett.

White said his group was formed four years ago when Gannett decided it was spending too much to hire outside consultants to manage relocations. Since then, the company has reduced its expenditures on office moves and other capital projects by 30% to 40%. ■

Managers selective about conferences

continued from page 23

conference in San Diego every year but has only enough time to spend one day there. He also attends the International Communications Association's (ICA) annual conference when it comes to nearby Anaheim, Calif.

Wood said he heads straight to the exhibit floor, bypassing any tutorial sessions or socializing with peers. "My time is valuable, so I just go to see all the new bells and whistles at the exhibits and then leave," he said.

Wood said he particularly likes the TCA show because it has a large number of exhibitors and a crowded exhibit floor.

"You can see so many vendors in such a short period of time [at the TCA show]," Wood said. "And because the booths are usually so packed and vendor reps so busy, you can get the information you need without having to listen to a long sales pitch."

Other managers find that peer-to-peer networking is the most valuable reason to attend conferences.

Lipton said the first thing he does when arriving at a conference is get a copy of the list of attendees.

Then he calls people he knows at the conference and makes appointments to see them.

"I spend a good deal of time networking with other professionals," Lipton said. "They often can help you solve problems you're wrestling with."

But some network managers find that general, broad-based conferences have less and less value for them as they advance in their profession.

Low expectations

Bill Rush, vice-president of IS at The Prudential Service Co. in Roseland, N.J., said too many conferences fall short of expectations so he goes to as few as possible.

He added that most conferences offer him little opportunity to network with colleagues at other companies because few managers at his level attend conferences.

"The more senior you get, the more difficult it is to find your peers at conferences," Rush said.

As a result, Rush said he likes to attend seminars in which a vendor, such as AT&T or IBM, invites a select number of senior executives — no more than 30 or so — to discuss the vendor's strategic direction or examine a particular technology. ■

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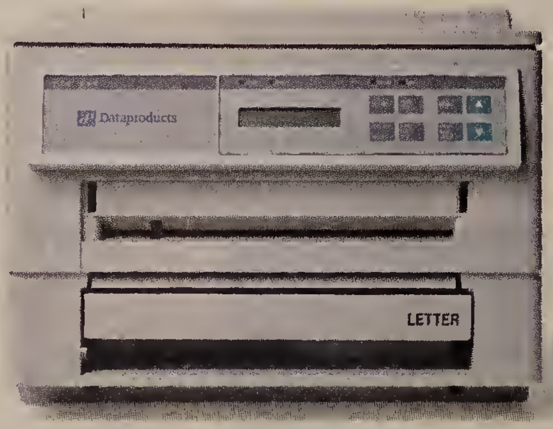

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See The FAXNeT Form on Page 57

Worth Noting

> "The systems requirement [for a currency trading network] is that you have a very reliable global network. This is a volatile market. You can't afford to go out of service for even a minute while someone's making a $10 million trade."
>
> **John Beckert**
> Director of marketing and sales
> Quotron Systems, Inc.
> Los Angeles

World News

Reuters Holdings PLC has confirmed that systems problems have delayed beta tests of its Dealing 2000-2 international currency trading network, a new version of the company's major revenue producer, the Reuter Monitor Dealing System.

Originally scheduled to go on-line by the end of this year, most observers now expect Dealing 2000-2 to debut sometime in 1991.

According to the U.S. newsletter *Trading Systems Technology,* Reuters is experiencing systems difficulties and other problems that make it concerned about its ability to control "liability for errors, including mismatched trades" on Dealing 2000-2.

Citing sources close to the project, the newsletter claimed that Reuters is considering changes to the rules governing trading on Dealing 2000-2 that "would reduce Reuters' responsibility for mismatched trades in the event of a systems failure."

A company spokesman confirmed that Reuters has run into delays getting Dealing 2000-2 into beta test. The delays are due, he said, to bugs in software provided by third-party suppliers and are mainly peripheral to the core trading system, which is performing well under rigorous in-house testing. ◼

Canadian firms seek OK to offer long-distance services

BC Rail, Lightel could spur market competition.

By Barton Crockett
Senior Editor

OTTAWA — A network unit of BC Rail, Ltd. and start-up carrier Lightel, Inc. recently petitioned the Canadian government for permission to offer switched long-distance services.

The July 30 filing, if approved, would heighten competition in a market that has been largely closed to would-be rivals for years. Currently, Canada's local carriers have a monopoly over long-haul switched services and work together to pass off traffic to one another.

BC Rail and Lightel provide some competition by using their own facilities to furnish private-line services, but they and other companies are not allowed to provide switched long-haul services in direct competition with local carriers.

Approval of the BC Rail and Lightel petition would dramatically change the market, especially if the Canadian government also approves a request levied last spring by private-line services provider Unitel Communications, Inc. to enter the switched long-haul market.

BC Rail and Lightel asked that their petition be judged in conjunction with the pending Unitel petition, which means the Canadian government could establish two new full-service long-distance companies in the country.

"As users, we're excited about the possibility of this kind of competition," said Brian Callihoo, manager of telecommunications at the London, Ontario, brewer John Labatt, Ltd. and president of the Canadian Business Telecommunications Alliance, a user group in Toronto.

Merging separate networks

In their joint petition, BC Rail and Lightel said they plan to merge their separate networks into a facility that could be used to supply interexchange switched services to users throughout British Columbia, Ontario and Quebec — Canada's largest provinces.

BC Rail currently operates a private microwave network running alongside its parent company's railroad tracks in British Columbia.

Lightel, which was founded in the spring of 1989 with approximately $4.3 million ($5 million, Canadian) in venture capital from Call-Net Telecom-

(continued on page 30)

INTELSAT shifts satellites to boost Pacific capacity

By Walter Sweet
West Coast Correspondent

WASHINGTON, D.C. — The International Telecommunications Satellite Organization last week said it has begun a massive redeployment of its satellite network to meet increased demand for services in the Pacific Ocean region.

By moving some of its highest capacity satellites into position over the Pacific and Indian oceans, INTELSAT will create extra capacity to satisfy demand for service until the organization can launch three more satellites next year.

A grand scale

Although INTELSAT has often repositioned its satellites, it has never done so on such a grand scale. Currently, the organization is moving six satellites to accommodate growing demand for telephony and broadcast services and Intelsat Business Services (IBS), which are private voice and data transmission services.

"Capacity is tight," said Tony Trujillo, an INTELSAT spokesman. "So we're attempting to put the satellites with the greatest capacity where they are needed most."

IBS support

According to Trujillo, INTELSAT supported 9,111 channels of IBS last year, up 25% from the previous year.

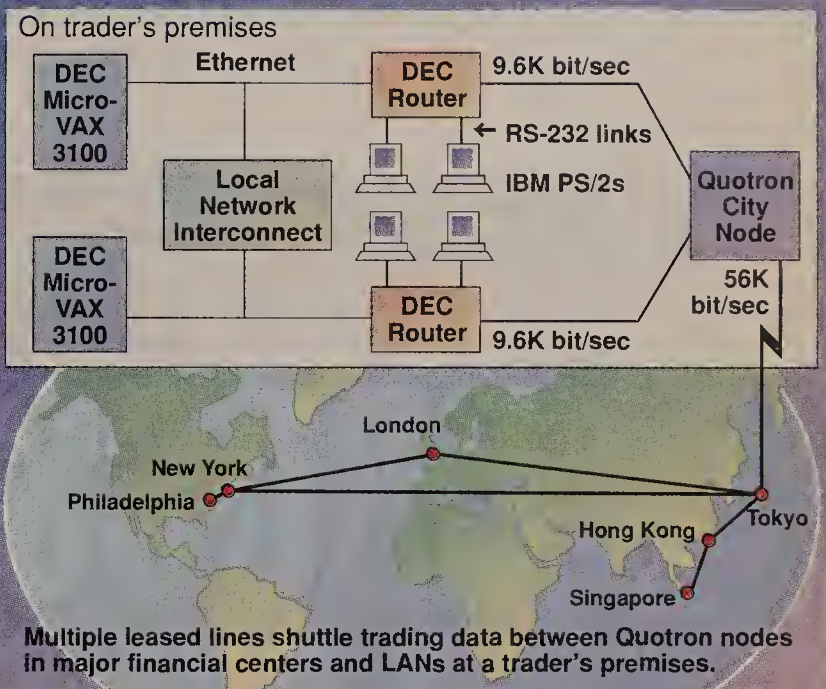
Trujillo said he did not know how many channels would be added with the new satellites or what new services would be available. IBS services make up 6.6% of INTELSAT's total revenue, he added.

To add extra capacity, INTELSAT will launch three new INTELSAT VI satellites: two beginning in the early part of 1991 and a third in the end of the year. Those satellites, however, will not begin service until four to six months after they are deployed.

(continued on page 30)

Quotron's F/X Trader

New currency trading net links local and remote traders



Multiple leased lines shuttle trading data between Quotron nodes in major financial centers and LANs at a trader's premises.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: QUOTRON SYSTEMS, INC., LOS ANGELES

Quotron unveils new currency trading net

Firm hopes performance of F/X Trader net will lure users from Reuters Holdings PLC's service.

By Barton Crockett
Senior Editor

LOS ANGELES — Betting it can muscle in on turf now dominated by Reuters Holdings PLC, Quotron Systems, Inc. is cutting over a new network-based foreign currency trading system dubbed F/X Trader.

Company officials said the network will provide subscribers with faster transaction processing than rival trading networks and can support more trades simultaneously.

F/X Trader is Quotron's first entry in the growing market for on-line currency trading networks, which is currently dominated by the Reuter Monitor Dealing Service, a currency trading net that was launched in the early 1970s and is now used to complete most of the world's large currency trades.

Telerate Systems, Inc., which is owned by Dow Jones & Company, Inc. in New York, launched the first major competitor to Reuter's service late last year when it introduced the Telerate Trading Service.

Now Quotron's F/X Trader system is being unveiled, and the on-line market data supplier, based here, claims that F/X Trader will win a large following due to its technical superiority.

"We've got commitments from more than 40 of the largest banks in the world, and by year end, we'll be in each of the world's eight major financial centers," said John Beckert, F/X Trader's director of marketing and sales. "People are looking to get out of a monopoly environment so they're very keen on using a system like ours."

F/X Trader began supporting trading between London and New York last summer and went on-line in Hong Kong, Singapore and Tokyo last week.

Quotron said it expects that 100 of the world's largest currency trading institutions will subscribe to the service by year end.

Nearly every large currency trade occurs over some kind of trading network because few physical exchanges support currency trading. In addition, currency traders are so widely dispersed that global nets are needed to get traders together.

> "We've got commitments from more than 40 of the largest banks in the world."
>
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FX/Trader runs on Digital Equipment Corp. MicroVAXes and IBM Personal System/2s installed at the trader's premises. Those devices are hooked up to local DEC Routers using DECnet local-area network and RS-232 links.

The DEC Routers, in turn, are

(continued on page 28)

Quotron unveils trading net

continued from page 27

linked via 9.6K bit/sec leased lines to remote F/X Trader City Nodes, each of which consists of two MicroVAXes.

City Nodes handle traffic from different subscribers in a major city or metropolitan area and route transactions to other local subscribers or to users attached to other City Nodes.

City Nodes are interconnected by multiple 56K and 64K bit/sec leased lines. They are also connected via a City Node in New York to a Quotron data center in Philadelphia (see graphic, page 27).

When traders log on to their PS/2s, either of the DEC MicroVAXes at the trader's premises download the latest version of F/X Trader software to the trader's microcomputer. This software manages all aspects of negotiating and finalizing a trade by sending out messages over the F/X Trader wide-area network to other parties.

According to Beckert, F/X Trader software is downloaded each night from the Philadelphia data center to subscribers' MicroVAXes.

This enables F/X Trader to distribute nightly to its subscribers the latest versions of trading software along with the names and logons of new traders and subscribers to the network.

Beckert said that running trading software locally on the PS/2s improves network processing and response times. He added that F/X Trader has an edge over its rivals by supporting a maximum of six simultaneous trading sessions. The Telerate Trading System and the Reuter Monitor Dealing network support only four simultaneous trading sessions, he said.

Massive outsourcing deal

In order to get the network up and running, Quotron is relying extensively on outsourcing services from DEC and US Sprint Communications Co.

Beckert said Quotron personnel man 24-hour service centers where customers call for service requests. Quotron personnel then hand off all service and installation requests to local DEC personnel dedicated to servicing F/X Trader subscribers worldwide. He added that Quotron is relying on US Sprint to acquire and install all WAN links used to support the F/X Trader network.

> "Relying on our strategic partners gives us a consistent level of support," Beckert said.
>
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"We can't be everything to everybody all over the world," Beckert said. "Relying on our strategic partners gives us a consistent level of support and lets us focus on the strategic things we do best."

Beckert predicted that F/X Trader will win a large following from traders tired of dealing only with Reuters. Already, such large currency traders as the Bank of Tokyo, Chemical Banking Corp., Goldman Sachs & Co. and Morgan Guaranty Trust Co. of New York plan to subscribe to the network, a Quotron spokeswoman said.

Tough road ahead

But persuading traders to use F/X Trader may be tough. According to Kenneth Leon, a securities analyst with Bear Stearns & Company, Inc. in New York, currency traders will be wary of the Quotron network because Quotron is owned by Citicorp, a rival large currency trader. Another problem is liquidity, or the ability to attract enough traders to make deal completions easy.

Since Reuters has vastly more subscribers than the other two networks, it has a huge advantage in this regard.

"One would think that in any market, customers would necessarily want at least two or more suppliers, but here, this may not be the case," Leon said. "Lots of people may end up installing these other systems but, in practice, only use Reuters because Reuters is so dominant." ◪

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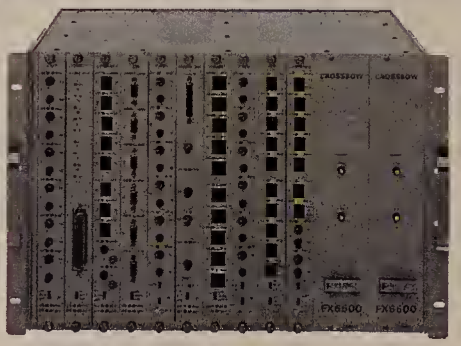

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Canadian firms seek OK

continued from page 27

munications, Inc., a Canadian network reseller, and other investors, is laying fiber-optic cables running from Toronto to Buffalo, N.Y., and from Montreal to the New York state border, where it will be linked to the U.S. public network.

Also, Lightel plans in 1991 to lay a fiber-optic cable running from Vancouver to Seattle.

By joining and expanding both the BC Rail and Lightel networks, the companies said they will be able to extend their network into all Canadian cities and towns with a population of 25,000 or more in the three provinces they plan to serve.

BC Rail and Lightel stated in their filing that their average price per minute for long-distance services in Canada would be 36.3 cents (42 cents, Canadian) in 1992, dropping to 26.1 cents (30.3 cents, Canadian) in 1996.

This compares to expected average prices from other carriers of 35.9 cents (41.7 cents, Canadian) in 1992 and 27.1 cents (31.5 cents, Canadian) in 1996.

BC Rail and Lightel predicted that their total revenues from interexchange switched services would be $125,560 ($146,000, Canadian) in 1992 and $270,900 ($315,000, Canadian) in 1996.

Welcoming competition

Callihoo said that in his opinion, Canada's users would welcome having a third full-service, long-distance carrier.

He said users are concerned that if only two carriers are allowed, a duopoly situation will arise, limiting price savings and new service advantages of competition.

He said this is especially true given that Unitel has asked that regulators fix a mandatory price differential between Unitel's switched services and those from Canada's dominant carriers so that the start-up can gain enough market share to be viable. Callihoo said Unitel has asked for a price differential of 15% for the first four years of service, dropping progressively to a 5% price differential for the eighth through the 15th year of operation.

> Callihoo said Canada's users would welcome a third long-distance carrier.
>
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Callihoo cautioned, however, that BC Rail and Lightel could face a difficult time getting approval to compete in the switched long-haul services market because of concerns that Canada is not large enough to support three full-service, long-distance carriers. ◪

INTELSAT shifts satellites

continued from page 27

One satellite each will be added over the Atlantic, Indian and Pacific oceans.

Trujillo said redeployment of the satellites will not disrupt service to customers due to use of the "pass in the night" point-over technique.

Pass in the night

With "pass in the night," a replacement satellite drifts until it reaches a point where both the new and old satellites are effectively collocated for as long as two hours. During that time, traffic is transferred from the old satellite to the new one on a beam-by-beam basis, with the transponders on the new satellite switching on and the transponders on the old satellite deactivating.

Each beam takes roughly one minute to transfer data and then runs a series of checks before proceeding to the next beam. It takes about 45 minutes for a fully loaded INTELSAT V/V-A satellite to transfer operations to another model or to an INTELSAT VI.

Trujillo said the satellite redeployment will be completed by year end. ◪

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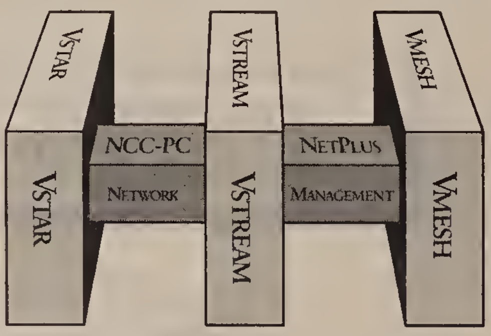

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PRODUCTS & SERVICES

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First Look

Spectrum file-transfer software supports LU 6.2

Spectrum Concepts, Inc. recently introduced file-transfer software for IBM VM mainframes that supports IBM's LU 6.2 peer-to-peer communications protocol.

XCOM 6.2 VM is software that runs on a VM mainframe and lets users supported by that mainframe transfer files to users on any other system that supports the LU 6.2 protocol, including non-IBM systems.

The software also enables functions such as remote print distribution, batch file transfer and software distribution across a network.

Spectrum previously offered LU 6.2 software for a variety of IBM and non-IBM processors, including MVS mainframes, Application System/400s, System/3Xs, Digital Equipment Corp. VAXes, Unix workstations, DOS and OS/2 personal computers, as well as Apple Computer, Inc. Macintoshes.

VM mainframes can exchange files with any of these types of systems running Spectrum's LU 6.2 software.

LU 6.2 is the peer-to-peer communications protocol defined under Systems Application Architecture, a set of IBM interfaces and protocols that can be used to develop applications that operate across IBM's line of processors.

XCOM 6.2 VM is available now. Pricing ranges from $19,120 to $49,520, depending on the VM mainframe in use.

Spectrum Concepts, Inc., 150 Broadway, New York, N.Y. 10038; (212) 766-4400.

Firm to unveil intelligent MAUs, mgmt. software

General Technology, Inc. is expected to unveil at Networld '90 in Dallas this week intelligent token-ring media access units (MAU), as well as a system for managing them.

The new **GT16N** MAUs can be managed using General Technology's **Smart-View** software running on an IBM Personal Computer XT, AT or Personal System/2 that communicates via out-of-band sig-

(continued on page 34)

Product positions VAXes as servers on Token-Rings

Firms team up for announcement at NetWorld.

By Tom Smith
New Products Editor

DALLAS — Interconnections, Inc. and Simpact Associates, Inc. are expected to introduce here this week a product that enables Digital Equipment Corp. VAXes to function as file and print servers on IBM Token-Ring LANs.

Set for introduction at NetWorld '90 in Dallas, the I* for Token Ring consists of a previously available Token-Ring interface for the VAX developed by Simpact and new software developed by Interconnections that supports the Server Message Block (SMB) protocol used in IBM's PC LAN program.

The product complements existing Interconnections packages that allow the VAX to function as a server for Ungermann-Bass, Inc. Ethernets supporting Xerox Corp.'s Xerox Network Systems and Transmission Control Protocol/Internet Protocol.

In addition, Interconnections offers a product that enables 3Com Corp. 3+ and 3+Open users to utilize a VAX as an Ethernet server.

NETBIOS link

I* for Token Ring's hardware component, the TCI 2300 NETBIOS Token Ring Adapter, resides in any VAX processor with a Q-bus. The interface card, which supports the Network Basic I/O System, provides the physical connection between the VAX and the Token-Ring LAN.

The software, which also resides in the VAX, translates files between formats supported by DOS and OS/2 LANs on the Token-Ring to VAX file formats supported by the processor's VMS operating system.

> The I* for Token Ring consists of a previously available interface and new software.
>
> ▲▲▲

Files on the VAX thus appear as local DOS or OS/2 files to personal computer users on the LAN.

Personal computer users can access files created by LAN users and users supported directly by the VAX provided that those files are stored on the VAX.

To enable the personal com-

(continued on page 34)

Altos implements Portable NetWare on 80486 systems

SAN JOSE, Calif. — Altos Computer Systems recently announced a version of Novell, Inc.'s Portable NetWare that enables Altos Unix-based multiuser systems to function as NetWare servers.

The NetWare for Altos Unix software runs on Altos' PowerServer/5000 and Multiuser System/5000 systems, which are based on Intel Corp. 80486 microprocessors. They allow DOS client workstations on the NetWare local-area network to benefit from the high performance and multitasking of Unix in applications such as transaction processing and data base queries.

Users can initially deploy Altos' Unix platforms as servers in Ethernet LANs. Subsequent releases will support token-ring LANs. The Altos hardware platforms run Altos Unix System V/386 Release 3.2, which is Altos' implementation of The Santa Cruz Operation, Inc.'s SCO Unix.

The Altos servers can transparently provide file and print services to DOS and OS/2 clients on the LAN because NetWare for Altos Unix supports NetWare Virtual Terminal, a protocol that enables DOS and OS/2 clients to emulate ASCII terminals for communications with the Unix server.

The two Altos servers can each support 128 users simultaneously, or a maximum of 512 users. Both have built-in support for Ethernet, Transmission Control Protocol/Internet Protocol and Sun Microsystems, Inc.'s Network File System. The PowerServer/5000 supports twice the main memory and storage capacity of the Multiuser System/5000.

NetWare for Altos Unix costs $7,800 and supports as many as 250 users on each of the Altos Unix servers. It is available now.

Altos can be reached by writing to 2641 Orchard Pkwy., San Jose, Calif. 95134, or by calling (408) 432-6200. ⧉

BICC bolsters ECS E-net hub

Product	Description	Features	Cost
ISOLAN EtherConnect System (ECS)/4 hub	Supports as many as four interface cards	Supports all interface cards offered for ECS/10, including Ethernet interfaces and a newly announced bridge; can support 400 users	$1,595 for the unit; interfaces priced separately
1203-1 Shielded Twisted Pair System	Links shielded twisted-pair Ethernets to ECS/4 and ECS/10 hubs	Consists of an interface card, eight-port distribution panel and transceivers	$1,595
1205 Managed Bridge Line Card	Links local ECS hubs to each other	Supports the Spanning Tree Protocol; filters data so it is not broadcast to all Ethernets supported by the hub	$4,495
1201-4 Multiport Transceiver Line Card	Supports four attachment unit interface ports to link Ethernets to the ECS	Eliminates the need for stand-alone hardware by providing four separate transceivers on one interface in the ECS/4 or ECS/10	$495

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: BICC DATA NETWORKS, INC., WESTBOROUGH, MASS.

BICC broadens E-net hub product family

Vendor adds to its ECS line with low-end hub, shielded twisted-pair system and local bridge.

By Tom Smith
New Products Editor

WESTBOROUGH, Mass. — BICC Data Networks, Inc. is expected to introduce today several enhancements to its ISOLAN EtherConnect System (ECS) wiring hub, including a low-end model, support for shielded twisted-pair Ethernets, an Ethernet bridge and a four-port Ethernet transceiver.

The new low-end ECS/4 hub and the 1205 Managed Bridge Line Card will make it easier for users to link departmental Ethernets into larger centralized hub wiring centers.

The other new products broaden the ECS family's appeal by making them practical for use in a greater number of network environments. All of the new products are available now and will be demonstrated at NetWorld '90 in Dallas this week.

Low-end hub

The new four-slot ECS/4 hub offers users the same functions as the existing 10-slot ECS/10, including support for all of the interfaces offered by the company.

All of the BICC Ethernet cards have integral repeaters that broadcast a signal on one card to all other interfaces in the hub. The Ethernet interfaces have between four and eight ports to support the connection of Ethernet subnets. The new hub can support approximately 400 users. ECS/4 costs $1,595, with interfaces priced separately.

The new Ethernet bridge, the 1205 Managed Bridge Line Card, will enable users to connect Ethernets on a local basis, such as between floors, as well as to segment Ethernets for performance purposes. It enables any Ethernet supported by the hub in which it resides to communicate with other Ethernets residing in another hub equipped with the interface.

The bridge supports the Spanning Tree Protocol. Unlike repeaters, which regenerate and broadcast signals to an entire hub, the bridge's filtering capabilities enable users to send data to a specific Ethernet in another hub without broadcasting it to every Ethernet supported by that hub. The bridge costs $4,495.

> The new four-slot ECS/4 hub offers users the same functions as the 10-slot ECS/10.
>
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BICC also introduced the 1203-1 Shielded Twisted-Pair System, which consists of an interface card for its hubs, an eight-port distribution panel and transceivers.

(continued on page 32)

Codenoll to announce fiber E-net interfaces for PCs with MCA bus

Three new boards connect nodes to passive, active hubs.

By Tom Smith
New Products Editor

DALLAS — Codenoll Technology, Inc. this week is expected to introduce at NetWorld '90 in Dallas three fiber-optic Ethernet adapter boards for personal computers based on IBM's Micro Channel Architecture (MCA).

Codenoll will unwrap two interfaces that link personal computers via fiber-optic cable to passive star wiring hubs and a third that supports connections to active star hubs.

The new boards could prove especially attractive in fiber-based factory-floor nets, where there is a high level of electrical interference. Fiber-optic cable offers immunity to interference and more security than other Ethernet cabling types.

The CodeNet-8320 and CodeNet-8322 are both designed for connection to passive hubs.

The CodeNet-8320 is based on a new transceiver from Codenoll that uses a less powerful transmitter and more sensitive receiver than the 8322, which employs an older technology. Thus, the CodeNet-8320 is less likely to saturate available bandwidth.

The 8322, however, comes with a more powerful data transmitter and less sensitive receiver than the newer model. Codenoll is offering the product to support current customers whose networks use that earlier transceiver.

MCA support

The new 8321 supports the connection of MCA-based microcomputers to active star wiring hubs. It supports the Fiber Optic Inter Repeater Link, an IEEE Ethernet standard that allows the 8321 to support passive hubs and regenerate the hubs' signals for communications over a longer distance or between passive hubs.

All three of the new interfaces can attach workstations to Codenoll's CodeStar passive hubs and its CodeNet 4300 active hub.

Codenoll previously offered fiber-optic Ethernet interface cards for Industry Standard Architecture and Extended Industry Standard Architecture personal computers. With support for MCA, Codenoll now offers fiber-optic interfaces for IBM's MCA-based Personal System/2 microcomputers, as well as MCA personal computers offered by other vendors.

The 16-bit Codenoll interface cards come with software drivers for Novell, Inc.'s NetWare, Microsoft Corp.'s LAN Manager, Interactive Systems Corp.'s Interactive Unix and several other DOS- and Unix-based operating systems.

The 8320 and 8321 cost $895, while the 8322 costs $995. The interfaces are available now.

Codenoll can be reached by writing to 1086 N. Broadway, Yonkers, N.Y. 10701, or by calling (914) 965-6300. ◘

BICC broadens E-net hub product family

continued from page 31

As many as eight Ethernets can be connected to the new 1203-1 Shielded Twisted Pair Line Card through an eight-port rack-mountable distribution panel. Each Ethernet node also requires an 1182 Shielded Twisted Pair Transceiver to attach to the distribution panel.

Users can purchase all of the required shielded twisted-pair components for $1,595 as one product, the 1201-3 Shielded Twisted Pair System. Or if they have a distribution panel, they can purchase the Ethernet interface and the transceiver separately for $1,295 and $195, respectively.

Finally, BICC introduced the 1201-4 Multiport Transceiver Line Card, which has four separate attachment unit interface ports that enable users to attach devices such as personal computers or terminal servers directly into the transceiver card, which resides in the hub. Those devices can then communicate with other Ethernets over the hub's backplane.

The 1201-4 Multiport Transceiver Line Card enables users to install a single transceiver card.

▲▲▲

The 1201-4 Multiport Transceiver Line Card, which costs $495, enables users to install a single transceiver card instead of four separate transceivers.

Like the existing ECS products, the new components can be managed via ISOView, the company's personal computer-based management system that communicates with Ethernets via an interface that resides in the hub.

For more information, contact BICC by writing to 1800 W. Park Drive, Westborough, Mass. 01581, or by calling (508) 898-2422. ◘

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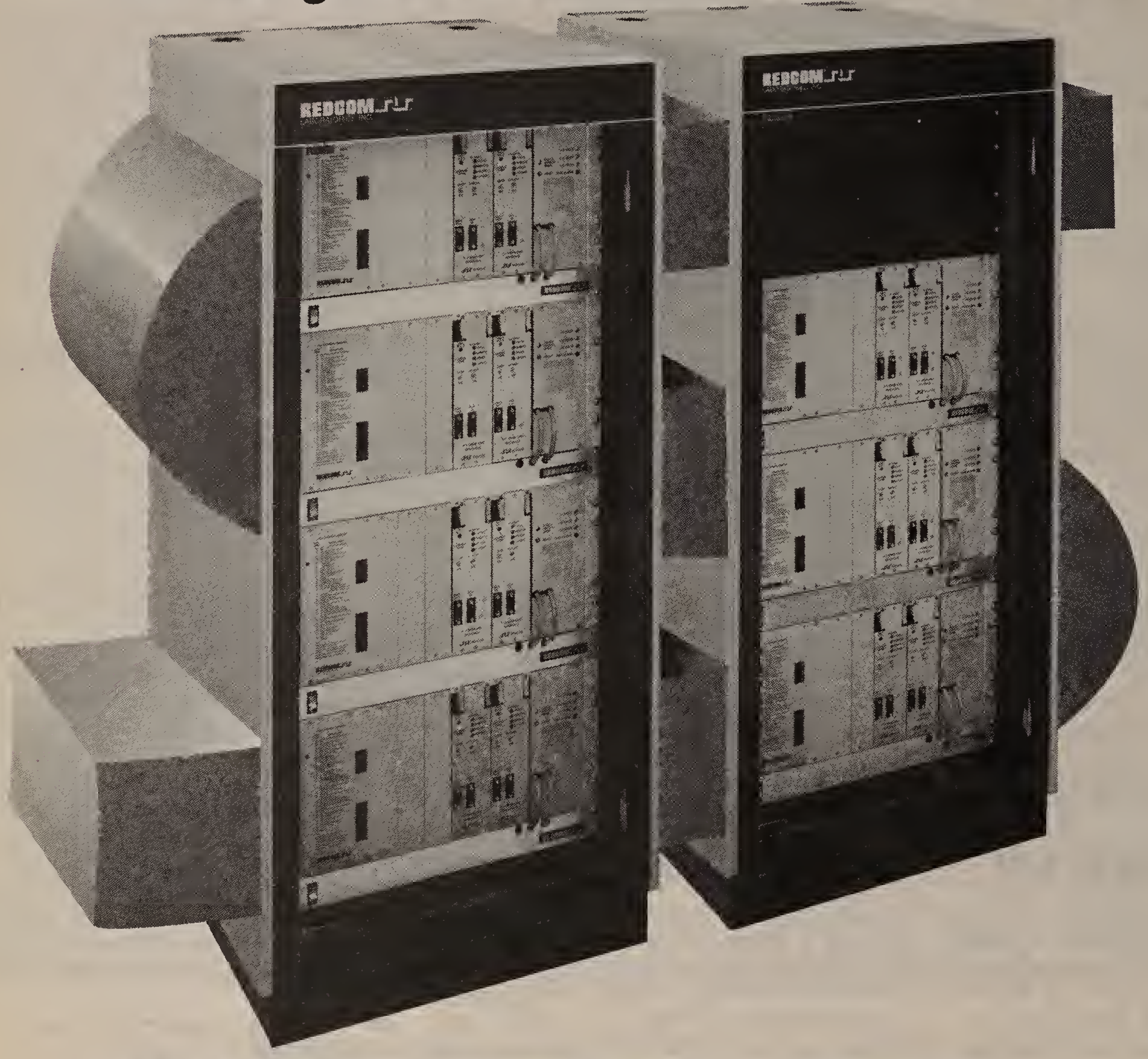
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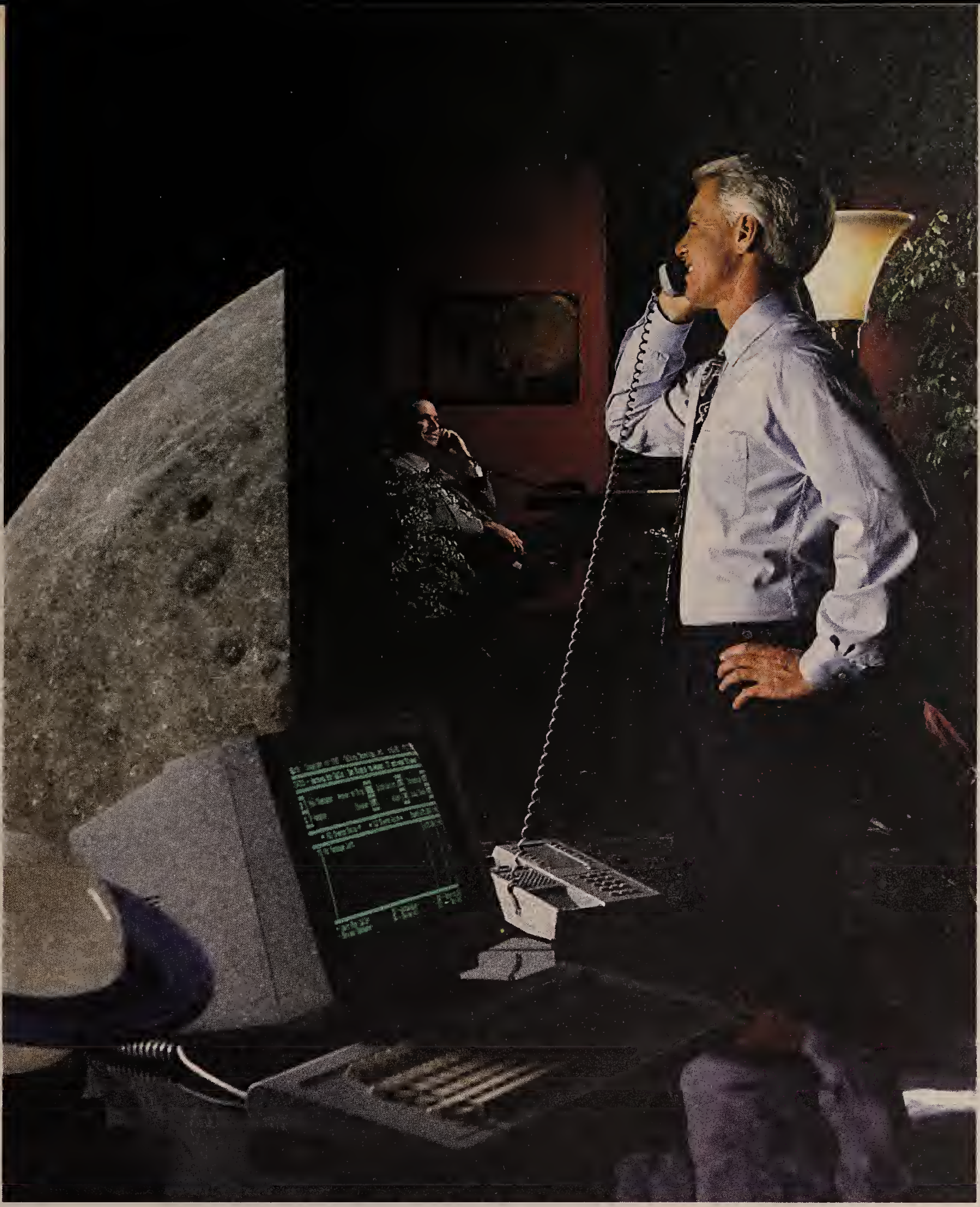

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First Look

continued from page 31

naling with the MAUs. The GT16N units can be daisy-chained at a local site. In this case, one of the GT16Ns would be linked via an RS-232 port to the personal computer running Smart-View. Remote MAUs can also be managed via a 2,400 bit/sec modem. The system can manage 31 MAUs.

Smart-View provides real-time graphical displays that enable net managers to monitor and control the physical layer of a 4M or 16M bit/sec token-ring network. It displays real-time alarms that are user-definable. The software also enables a network manager to isolate problems down to the port level on a MAU and shut down a single port or the entire MAU.

The GT16N MAU with Smart-View software is expected to be available by the end of September for $999.

General Technology, Inc., 415 Pineda Court, Melbourne, Fla. 32940; (800) 274-2733.

Republic Technology plans to unveil diskless workstations for LANs

Republic Technology Corp. is expected to announce at NetWorld '90 in Dallas this week two diskless workstations designed for use in local-area networks.

The company's **Remote Processor Module (RPM)** is being offered in two versions: one based on an Intel Corp. 80286 microprocessor, the other on an 80386. All of the versions are configured with 1M byte of main memory that is expandable to 4M bytes of memory.

The diskless workstations, which support Novell, Inc.'s NetWare and other DOS-based LAN operating systems, will support Ethernet and Arcnet in their initial release and later be enhanced for token ring.

The workstation can operate on a stand-alone basis, in which case it will run remotely from a host computer or server. If running from a host, the user can utilize the diskless computer's drive emulator to run a terminal-emulation program.

The 80286-based RPM costs $1,595 for the Ethernet version, which is available now, and $1,525 for the Arcnet version, which will be available Oct. 1.

The 80386-based RPM costs $1,895 for the Ethernet version and $1,725 for the Arcnet version. Both will be available by the end of October.

Republic Technology Corp., P.O. Box 141006, Austin, Texas 78714; (512) 834-2222.

NetWorth 10BaseT Ethernet hub sports network management

NetWorth, Inc. will introduce at NetWorld '90 in Dallas this week a 10Base-T Ethernet hub with network management capabilities.

EtherNext Series 4000 has several components: a three-slot or a six-slot **Network Command Center** hub, a 10BaseT Ethernet interface, a network management interface and network management software. It is optimized for Novell, Inc. NetWare local-area networks but can be used with any DOS-based LAN operating system.

Users can populate the hubs with 10-BaseT interfaces or reserve one slot for a network management card. The six-slot hub costs $1,295, while the three-slot model costs $995.

NetWorth offers a 12-port Ethernet interface, the **10BaseT Host Module,** for the two hub models. The interface, which costs $1,995, enables users to physically connect a maximum of 12 Ethernet nodes to the hub using 10BaseT unshielded twisted-pair cabling.

EtherNext Series 4000 also includes the **Network Management Module,** which works with **EtherManager Software** to monitor and control the LAN hub.

The net management software runs as a NetWare Value-Added Process or as a NetWare Loadable Module on a NetWare server so that a dedicated net management personal computer is not required.

Users can view statistics such as cyclic redundancy check errors, packet retry statistics, as well as receive and transmit errors. They can also activate or deactivate specific LAN nodes.

EtherNext hubs can be daisy-chained together, and the management system can be used to control as many as 1,024 nodes.

The management interface and software cost $2,395 each. The EtherNext Series 4000 is expected to be available by Nov. 1.

NetWorth, Inc., 8101 Ridgepoint Drive, Suite 107, Irving, Texas 75063; (214) 869-1331.

Product positions VAXes as servers

continued from page 31

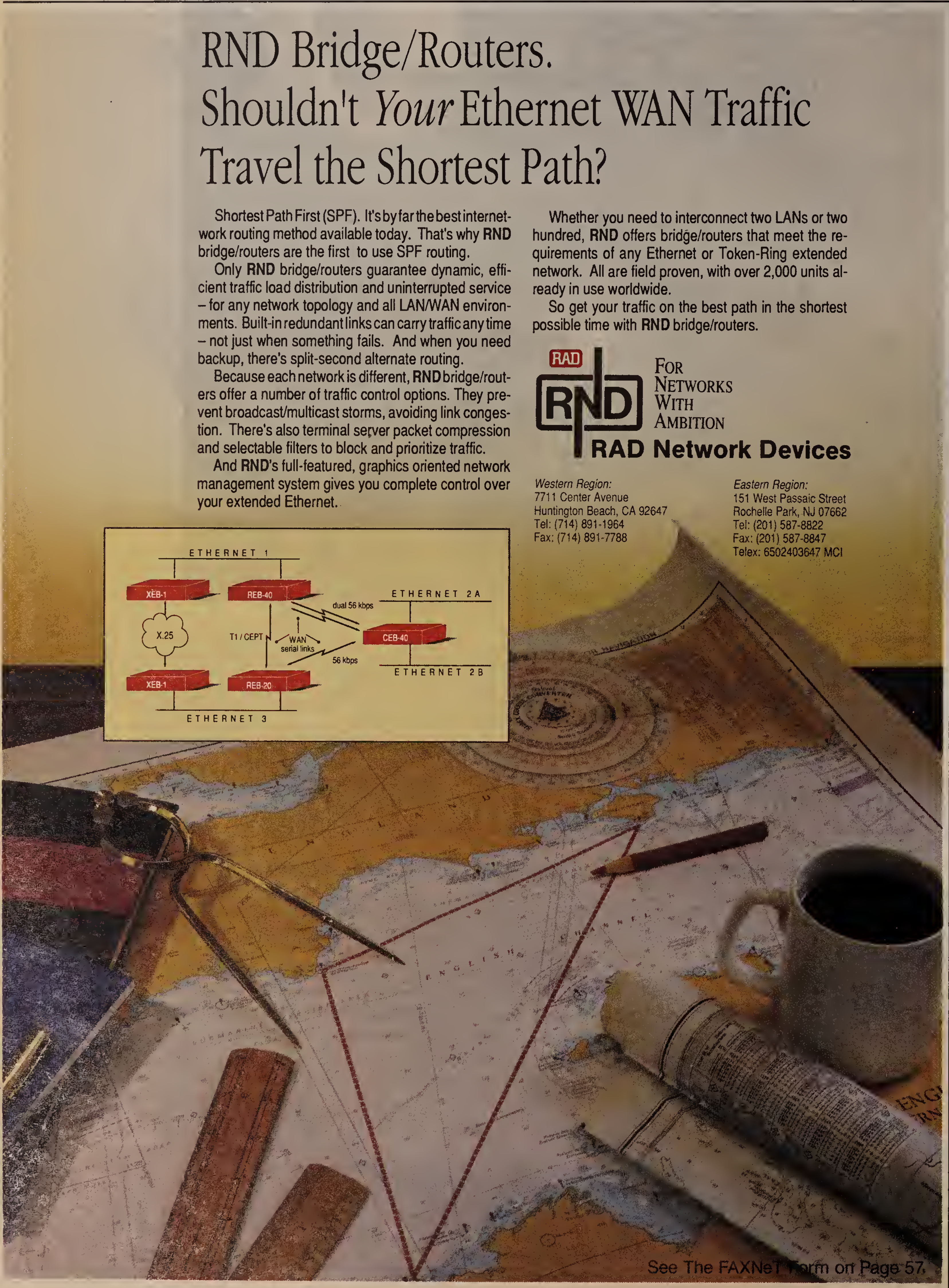
puters to access the file and print services supported on the VAX, the software employs the SMB protocol used in the Microsoft Corp. MS-Net and LAN Manager network operating systems on which the PC LAN Program is based.

I* for Token-Ring will be available in mid-November for prices ranging from $10,000 to $17,000, depending on the VAX model used.

Interconnections and Simpact will market the product jointly.

Interconnections can be reached by writing to 14711 N.E. 29th Place, Bellevue, Wash. 98007, or by calling (206) 881-5773.

Users can contact Simpact by writing to the company at 9210 Sky Park Court, San Diego, Calif. 92123, or by calling (619) 565-1865.



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ISDN

BY ALEX LYNCH

We just need to give the public net some time

"Without a killer application, it's going nowhere." "If you can't show me some applications, I really don't think we can use it." "Too little, too late; there's not enough bandwidth for what I'll be running in the future."

These oft-heard comments concerning Integrated Services Digital Network technology have no basis in fact; they are merely excuses for resisting change and continuing to think as we always have. This mind-set, which was formed from years of dealing with the slowly evolving telecommunications industry, is understandable.

However, the truth is that before ISDN is more widely deployed, there will be no "killer" applications simply because ISDN is a transport vehicle that integrates and controls existing services. Applications will evolve over time.

> The evolution of the public net toward end-to-end connectivity — and dynamic control of the network by the user — is only beginning.
>
> ▲▲▲

Users weren't aware of the possibilities that the personal computer presented to them when it was first introduced. Such is the case with ISDN as well.

Historically, both voice and data users have dealt with the analog telephone network as their interface for communicating with remote locations. The analog network's 3 kHz of bandwidth was the available limit, and developments were conceived within those limitations.

At this time, it's difficult to believe the argument that 144K bit/sec to the desktop is insufficient bandwidth for the near future. After all, the 9.6K bit/sec dial-up market is only starting to take off, and the high cost of 9.6K bit/sec dial-up modems will slow their deployment in the near future. If high-speed desktop performance is mandatory for a certain environment, then equipment can be developed to aggregate B channels or to use a Primary Rate Interface (PRI) or even multiple PRIs. The constraints are within our imagination, not within the technology.

The evolution of the public net toward end-to-end digital connectivity — and with it, dynamic control of the network by the user — is only beginning. Although great strides such as carrier systems, fiber deployment, switch enhancements, frame connectors and test equipment have been made to improve the network, the user interface into the network has remained pretty much the same. These enhancements were integrated into the network with little fanfare; therefore, most users were not even aware that advances were taking place.

Services such as selective forwarding or call blocking, user trace, stored memory of unanswered calls and automatic recall are overwhelming to some users. But communications professionals should not harbor such narrowly focused thinking. Instead of dwelling on what is wrong with ISDN, we should become actively involved in determining how best to use the services that ISDN makes possible.

Broadband ISDN, Synchronous Optical Network, asynchronous transfer mode and metropolitan-area networks are the hot news of today. But ISDN is a necessary stepping stone to these future technologies and will still be important after these newer technologies are fully deployed. The issue is not that one will replace the other, but how we can make them work together to our benefit. ◘

Lynch is a systems engineer with New Jersey Bell Telephone Co. in Woodbridge, N.J.

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EDITORIAL

Kudos to the Houston 30 in its open systems crusade

Network World applauds the members of the Houston 30 for saying aloud what needed to be said about the movement — or, more precisely, the lack of movement — toward open systems in the U.S.

Formed earlier this year by network and information systems (IS) managers from some of the top U.S. firms, the group's mission is to speed the development and deployment of open systems products.

As a first step toward this goal, the Houston 30 — so named for the number of members that attended the group's last meeting in Houston — recently issued a report examining the obstacles to the migration to open systems.

The report was nothing less than a declaration of war against proprietary systems.

"We need to take charge of our destiny by declaring global war against proprietary systems that hold data hostage," stated the report, titled "Overcoming Barriers to Open Systems Information Technology." "Systems entrapment is negatively impacting North American businesses and stifling creativity."

The group criticized vendors for moving too slowly in developing open systems products and for continuing to focus primarily on proprietary solutions to users' IS needs.

Laying all of the blame for the glacial migration to open systems at the feet of vendors would have been easy enough. But the Houston 30 went beyond that, chiding users for purchasing proprietary products despite almost universal support for open systems. In short, the group rapped corporate America for not voting with its dollars for open systems products.

In addition, the report criticized users for failing to adopt long-term open systems migration strategies, faulting "business practices that encourage a tactical — that is, short-term — approach to solving business problems while ignoring key strategic integration issues."

But the report went beyond finger-pointing to offer some ideas for speeding the evolution of open systems. Among those ideas was a call for a vendor-independent open systems user forum that would articulate user requirements in open systems and work with suppliers to see that those needs are met.

We hope the Houston 30, either on its own or in concert with an existing organization, will take on that job. We congratulate the group on the publication of this report and applaud the members for their conviction and involvement.

We encourage other network and IS professionals to lend their voices to this chorus by getting involved with this new but important organization. For information, contact Gail Arnett at (313) 769-4454. ◘

OPINIONS

INFORMATION TECHNOLOGY

BY JAMES KOBIELUS

Communications has made us an interrupt-driven society

Life is a series of interruptions. At home or at the office, we continually fend off demands for our time and attention.

Information technologies introduce new interruptions into our lives. The interruptions from technology fall into two categories: interpersonal and impersonal.

Interpersonal interruptions occur when people use technology to butt in on one another. Consider the telephone, perhaps the greatest interruption tool of the modern era. When that bell rings, you are almost compelled to put down what you're doing — no matter how important — to answer it.

Living with a telephone means sacrificing your privacy to anyone who happens to call. In picking up the receiver, you're granting the mystery caller a piece of your precious time, and you can only hope it's someone whose interruption you'll welcome.

Incoming callers often expect — and get — preferential treatment over other people and tasks. How often have you sat in someone's office for a seeming eternity while he or she chats on the phone with someone who more or less barged in electronically?

The French upper classes long resisted the telephone because they saw it for what it is: a device that puts its owner on call around the clock. We now feel a similar repugnance for paging devices and cellular telephones, which make it possible to interrupt people almost anywhere.

Traditional telephony places the receiving party at a distinct disadvantage. The recipient is unable to block the call, screen it, forward it, transfer it or reply at a more convenient time.

Fortunately, advanced technologies also provide us with the means for controlling or eliminating interpersonal interruptions. Voice mail puts call recipients on a more equal footing with call originators because it operates on a store-and-forward basis. Recipients may deal with callers — or ignore them — on their own terms. In responding, they themselves are choosing to interrupt rather than let someone else call the shots.

This issue can take on legal and civil libertarian overtones. For example, the public policy debate over automatic number identification services comes down to a question of conflicting rights.

> Living with a phone means sacrificing your privacy to anyone who happens to call.
>
> ▲▲▲

Does the calling parties' right to interrupt outweigh the called parties' right to protect themselves against interruptions? If callers can prevent disclosure of their numbers, they can bypass many call-blocking and call-diversion schemes.

The other type of interruption — impersonal — occurs when systems impede or disrupt the work flow, usually as a result of inadequate system design or engineering. The most prevalent impersonal interruption is slow system response — a long delay between user input and system reply. Slow response hurts user productivity, especially when the work is highly interactive. Response times should be below the threshold of user perception.

Instant response is still a pipe dream for most network and multiuser applications, and it's becoming a taller order to fill as users load high-resolution graphics, computer-aided design, multimedia and other bandwidth-hungry applications onto their networks. Systems can be tweaked in many ways to approach this ideal: beefing up network bandwidth, cleaving applications into client and server pieces and compressing data.

Another source of impersonal interruptions is the single-tasking personal computer. Single tasking, a feature of DOS machines, forces us to interrupt one activity to perform another, such as when we exit a report that we're creating with a word processor to transfer a file using communications software.

By contrast, multitasking computers free users to do several things concurrently. This may sound like a luxury, but users who depend heavily on their personal computers know better. The more we rely on computers, the more painful it is when the machines "lock" us out to complete some time-consuming chore. Busy people often need to do many things at once, and even minor interruptions in their work flow can become intolerable.

Interruptions aren't always bad, however. They can play a crucial role in a productive work environment. The telephone, an interruption machine, is also one of the best coordination tools around.

By contrast, most groupware offerings are somewhat ineffective because they lack the ability to interrupt people and remind them of commitments. This shortcoming could be overcome by integrating groupware, normally implemented on top of electronic mail, with private branch exchanges and voice-messaging systems. The system would automatically call people to remind them of meetings or assignments they must complete.

Then again, maybe this isn't such a good idea. We already have too many interruptions in our lives, many of them technology-driven. The last thing we need is a telephone that rings us three times a day just to nag. ◪

Kobielus, a contributing editor to Network World, *is a telecommunications analyst with Network Management, Inc., a Fairfax, Va.-based consulting firm.*

OPINION IS ULTIMATELY DETERMINED by the feelings, and not by the intellect, according to Herbert Spencer. So let us know how you feel, not what you think.

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If you'd like to write a column, call Alison Conliffe, assistant features editor, at (508) 820-7416 or fax your idea to us at (508) 820-3467.

TELETOONS

BY FRANK AND TROISE

Network Manager's Handbook:
Rule 62:
"Develop an efficient method for dealing with unsolicited phone calls."
Oh, a new product? Let me connect you to our cold-call telemarketing help desk..
KONG Amplification Systems
PHIL FRANK

LETTERS

Grappling with the gator

In reference to the "Alligators in the Swamp" article titled "Beating RAM cram" (*NW,* Aug. 6), you should be aware that the first IBM Personal Computer was released in the early 1980s, not 1970s. It had one cassette port, not two 320K-byte floppy disks. It had 16K bytes of random-access memory, not 64K bytes. When PC-DOS was later introduced, it supported single-sided, single-density disks, which were 160K bytes each.

How can you expect readers to trust you to guide them into the future if you don't know where we have been?

If there is a problem at all, it is not a shortage of RAM on DOS-based personal computers; it is that poorly trained and equipped users try to replace systems analysis with advice from unqualified "experts." Why do you encourage your readers to believe that a 640K RAM DOS-based machine is a suitable local-area network workstation?

The cost of a basic Intel Corp. 80386-based machine is less than the cost of the IBM Personal Computer configuration (circa 1984) described in the article. In contrast, the value of a user's time is at an all-time high. The salary of your typical reader for three months can buy more computing power than he or she can use on today's LANs.

Paul Schmied
Senior associate
Synergetic Design Associates
Arlington Heights, Ill.

Author's response: As the focus of the article was RAM cram and not a history of the IBM Personal Computer, I skipped the initial few iterations of the IBM machine in order to focus on early IBM DOS-based machines with enough horsepower to be widely used in real business applications.

(continued on page 74)

Network World *welcomes letters from its readers.*

Letters should be typed, double-spaced and sent to Editor, Network World, *161 Worcester Road, Box 9172, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

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LAN TEST SERIES

LAN analyzer performance

Testing the LAN testers

Network World and LanQuest put eight popular LAN analyzers through their paces.

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CONTINUED FROM PAGE 1

for playback and analysis, cable testing and broadcasting packets onto the network.

Our tests focused on two primary functions of interest to users — network monitoring (utilization) and packet capture — and one secondary function, protocol recognition and decode.

The analyzers

The analyzers tested were Cabletron Systems, Inc.'s LANView (for Ethernet), CXR Corp.'s Digilog LANVista (for Ethernet), Hewlett-Packard Co.'s 4972A (for Ethernet), Network General Corp.'s Series 500 Sniffer (for Ethernet, 4M bit/sec and 16M bit/sec token ring) and Series 700 Sniffer (for 4M and 16M bit/sec token ring), Novell, Inc.'s LANalyzer (for Ethernet), Spider Systems, Inc.'s Spider Analyzer 320 and 320R (for Ethernet and 4M bit/sec token ring) and VANCE Systems, Inc.'s ATS 1000 (for 4M and 16M bit/sec token ring).

Three of the analyzers had been upgraded since our last test article, and one had changed entirely.

Mick is vice-president of LanQuest Group and general manager of LanQuest Labs. Nagel is a senior technician at LanQuest Labs, a division of LanQuest Group in San Jose, Calif.

The LANalyzer has a new version of software, Version 3.0, that offers extended features, including expanded protocol decode, which now covers all seven layers of the Open Systems Interconnection model. It also offers a set of predefined experiments covering most typical applications. Each of the experiments can be customized and saved under a different name.

The Network General Sniffer received a software (Version 3.0) and hardware boost that extended support to a 16M bit/sec token ring. In addition, a LAN monitoring function similar to that offered in the Network General Watchdog has been added. (The monitoring function is currently available only for Ethernet; it will be extended to token ring later this year.) This time, we also tested a second Sniffer — the Series 700 — which is based on the IBM Personal System/2 Model 70 portable and is now offered only for 4M and 16M bit/sec token ring.

The VANCE Systems ATS 1000 now offers both 4M and 16M bit/sec token-ring support; the version previously tested supported only 4M bit/sec. VANCE Systems, which has been acquired by Bytex Corp. since the previous analyzer article appeared, says it plans to offer Ethernet support later this year.

The Digilog LANVista used in the previous test was a stand-alone unit. For this test, Digilog's parent company, CXR, provided a new kit system with a plug-in network interface card (NIC) and software, which we installed in a 386SX 4M bit/sec IBM clone.

The test network

To conduct these tests, we created three networks: one Ethernet, one 4M bit/sec token ring and one 16M bit/sec token ring. Each net consisted of 24 workstations and one master station.

All machines in the network were 8-MHz AT-bus clones. The Ethernet network was constructed using Novell NE1000 NICs and standard two-meter cable lengths. The token-ring networks used IBM 16/4 NICs, IBM 8228 media access units and standard two-meter Type 1 cabling.

The monitoring and capture tests required operating the analyzers under controlled network loads. We accomplished this by using the LanQuest Labs Testmaster, a modular test environment running under Network Basic I/O System. Testmaster runs on a platform supporting a network or

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group of connected networks. The platform consists of a central master station and a series of individual test, or "listener," workstations.

Although listener stations operate under NETBIOS, individual programs running on the network are not required to use NETBIOS, and can, therefore, avoid the acknowledgment overhead associated with it.

System operation is controlled by a series of scripts issued by the master station.

For this test, a set of seven scripts was created to form peer-to-peer communications between one, two, three, four, six, nine and 12 pairs of stations, for a maximum of 24 stations. In each script, one or more sender stations — depending on the number of pairs — sent 200 blocks of 8,192 bytes each to their receiver stations. The scripts were capable of generating network loads ranging from about 10% to more than 90% utilization, depending on the topology being used.

This program allowed us to transmit very precise amounts of data into the network. How this data is converted into packets depends on the topology and the NIC drivers being used. Under Ethernet, for example, each block generated eight 1,024-byte packets and one 4-byte packet — the last four bytes being added by NETBIOS. Packet sizes mentioned here represent only the data field of the packet.

The token-ring NICs, however, generated fewer data packets because the NIC driver allowed data fields of 2,000 bytes.

The data packets, of course, represent only a portion of the total packets on the network during the experimental runs. Other packets are generated to acknowledge the receipt of data packets and to manage network operations.

Under Ethernet, these management packets are generated by the task of moving the data across the network. Under token ring, management packets represent management of the data transfer task and general network management activity, which is ongoing as long as the network is functioning.

The majority of the management packets are quite short. Although they outnumber the data packets during the experiment, they represent only a small portion of the network traffic volume.

For Ethernet and 16M bit/sec token-ring tests, three, six, nine and 12 pairs were used for monitoring; one and three pairs were used for capture. For the 4M bit/sec token-ring monitoring, one, two, three and four pairs were used, and for capture, one and three pairs were again used.

Monitoring

Monitoring is essentially a proactive network management function used to characterize the operation of the entire network over some period of time. One can use a monitor to observe the operation of the network in real time or to take a snapshot of network operations, which can be compared against similar snapshots taken at different points in time. This allows network managers to identify changes in usage patterns so they can deal with them before they become problems.

Typical Ethernet and token-ring monitoring outputs include: total, average and peak measures for packets per second, bytes or bits per second, and average and peak utilization. Other outputs include breakdowns of packets by node, protocol type or channel, which can be defined in terms of protocol, node address and so on. Ethernet monitors also may report collisions, alignment errors, cyclic redundancy check (CRC) errors, short packets (typically containing 60 or fewer bytes), long packets (typically containing more than 1,524 bytes) and bad packets.

Utilization

To test network monitoring capabilities, we had the analyzers look for and report the following information: percentage of utilization of the network's data carrying capacity, number of good frames seen, number of bad frames seen and errors.

Utilization is a crucial measurement for LAN performance that shows the load on the network. Network managers depend on their analyzing equipment to accurately reflect this. But just how accurate were the utilization features shown by the LAN analyzers in our sample?

To test utilization, Testmaster programs were used to generate network loads ranging from 10% to more than 90% utilization by commanding increasing numbers of sending stations to transmit the 200 8,192-byte blocks to their pair partners. In the tests, all the analyzers and test stations were connected in a network so that all analyzers saw the same load simultaneously.

As part of creating traffic loads, each test program generated a specific number of frames; this provided a means of assessing the frame detection and counting accuracy of the respective analyzers. For Ethernet analyzers, reported collisions and bad frames were also collected.

The test programs did not count the total number of packets on the network because, as explained earlier, the data packets represent only a portion of the packets appearing on the network during the test. The remaining packets were generated by network stations for network management functions, including acknowledgment of received packets.

The Ethernet tests recorded maximum network utilization (percentage of the total network capacity used), good packet count, information on bad packets and other problems, and, when available, reported collisions.

To verify token-ring utilization, an ad-

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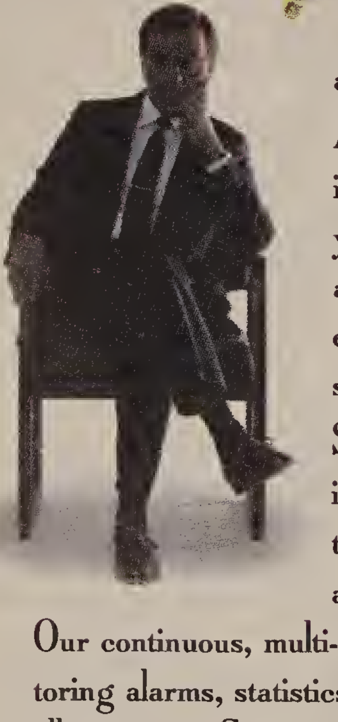

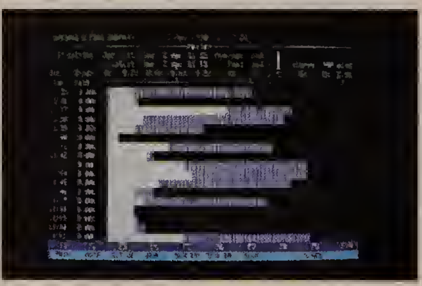

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ditional test unit was implemented: the IBM Trace and Performance (TAP) tool. This is a hardware/software combination that provides both monitoring and capture functions, including a very accurate network utilization meter. The frame counts for the token-ring analyzers have some variability due to the nature of token ring.

Utilization results

The Ethernet utilization results are shown in Figure 1 on page 45. Only three of the analyzers reported collisions: the HP 4972A, the Novell LANalyzer and the Spider analyzer. With three test stations transmitting at 653K bit/sec, the results were fairly consistent except for the Spider, which reported 368 short packets.

With six stations transmitting at 816K bit/sec, the Spider showed 7,011 short packets, the Cabletron product began to report a variety of errors including CRC, alignment and short packets, and the Novell and the Spider products both reported more than 10% fewer good packets.

At this point, the reported utilizations were within about 5%, except for the Spider.

At nine and 12 stations — 835K and 837K bit/sec, respectively — the pattern shown at six stations is more pronounced: the Spider analyzer showed significantly lower utilization and reported a very high number of short packets, the Cabletron product reported a variety of errors and the Novell LANalyzer reported the lowest number of good packets. What's going on?

The Spider demonstrated the most extreme results. The Spider Analyzer's Ethernet board failed shortly before the completion of our tests. Spider representatives tell us the data reported by the Spider in Figure 1 suggests that the Ethernet card was failing during this test. Unfortunately, by the time we received a new Spider Analyzer — which we used to verify protocol decode performance — the utilization test system had been disassembled.

The Cabletron LANView reported CRC and alignment errors that no other analyzer saw. We think the errors reported represent reaction to the stress produced by our tests, as no other analyzer reported CRC or alignment errors. Short packets could also be an indication of overload since our tests did not deliberately create any short packets.

The Novell LANalyzer reported the lowest number of good packets. Novell representatives told us this was probably because their system does not rely on the Intel Corp. 82586 chip to look at packets but instead uses a proprietary chip that provides a more accurate count of good frames and also detects collisions and packet fragments. They said they think that the results reported by other manufacturers are inadvertently including some collisions and short packets.

The remaining three analyzers — the Digilog, HP and Network General offerings — appear to report fairly consistent results across all four tests. However, our test methodology does not tell us which analyzer is the most correct.

Token-ring test

Figure 2 on page 45 shows the utilization and packet counts for the 4M bit/sec token-ring analyzers. The variations between the reported utilizations and packet counts appear to be acceptable except at the three-station load, where the two Network General Sniffers show somewhat higher utilization. This variation seems to be part of a problem we detected in the 16M bit/sec token-ring tests reported in the same figure.

It's evident from these results that the Network General Sniffers and the VANCE Systems ATS 1000 are having problems. Representatives of both companies were contacted about this.

According to VANCE Systems, the problems with packet counts and utilization measures at 16M bit/sec were caused by the way the program currently counts packets — the counts are made at a point where they can be affected by the performance of the capture buffer. A software fix has already been developed for this problem and should be available in the final quarter of this year.

The Spider had the most extreme results.

▲▲▲

Network General asserts that its product's problems were caused by the performance limits of the token-ring NIC used in both machines and that this problem has been fixed using a newer version of the NIC. They sent us a Sniffer with the new NIC, which we tested against the TAP tool at the nine-pair load. The new Sniffer agreed exactly with the utilization shown by the TAP tool. According to Network General, all 16M bit/sec token-ring Sniffers now include the new NIC.

We should point out that the stress levels generated in this test were very high, much higher than those found in a typical network. Few users will ever experience a network utilization load greater than 30%; most networks average less than 10%.

On the other hand, capacity to perform under stress is a very valuable asset, and stress testing is a good way to differentiate be-

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Inside the analyzers

The following comments provide additional details on our experience in working with the LAN analyzers during the tests.

■ **Cabletron Systems, Inc.'s LANView.** LANView distinguished itself in two areas: ease of use and quality of the monitor display.

The monitor screen displayed more information than any other unit tested. Although the information was presented in tabular mode, it was easy to read, particularly with a color monitor. Resetting the monitor took two keystrokes, and setup was simple. The capture buffer clearly showed which packets had been missed while the analyzer was cycling through first in, first out (FIFO) operation.

A slight loss of data occurs when the LANView's capture buffer fills. Other than that, we found no problems with the LANView in our tests.

■ **CRX Corp.'s Digilog LANVista.** The LANVista was the lowest priced analyzer reviewed and appears to be the best low-cost choice for multisegment and enterprise work. This is because individual boards or units can be placed on each segment and controlled from a central location, either over the LAN or via an RS-232 interface.

LANVista offered hardware filters and good nodal statistics. Both the monitor and capture functions were fairly easy to set up once we conquered the interface. The display screens were simple and had a strong graphical orientation.

We did find two problems with LANVista. Neither was serious, but both were annoying.

In our monitor tests, the LANVista behaved inconsistently during the high-stress — six-, nine- and 12-pair — runs. One run would be perfect, and the LANVista would show data similar to that of the other machines in the test. A subsequent run under exactly the same conditions would show significantly lower packet counts and a large number of lost frames.

A second problem surfaced when we attempted to view packets from the capture screen. The program would close out when we tried to view packets in raw or decode mode. (We were, however, able to reload the program and view the capture buffer without losing any data.) The only way around the problem was to exit the capture screen, move back to the main menu and select the "Viewing the capture buffer" item.

■ **Hewlett-Packard Co.'s 4972A.** The HP 4972A was the heavyweight of our Ethernet analyzers. The engineering style interface is initially formidable, but once you get beyond it and get an experiment running, it is extremely easy to take repetitive measures. Resetting the monitor took two keystrokes.

The monitor screen ranked second only to Cabletron's LANView in terms of the information presented and ease of reading. In addition, the HP 4972A was one of the few machines that showed Ethernet collisions.

Capture was also extremely simple, but feedback during capture mode was limited.

The HP 4972A was certainly the most programmable of the analyzers, thanks to the built-in high-level engineering language. The only negatives we found were the formidable upfront learning curve and the limited printer support. The unit supports only HP printers.

■ **Network General Corp.'s Sniffer Series 500 (Compaq) and Sniffer Series 700 (IBM Personal System/2).** The new versions of the Sniffer, Version 3.0, include monitor and analysis functions, as well as powerful reporting functions. One Sniffer is capable of remotely managing multiple Sniffers on network segments via a Sun Microsystems, Inc. workstation (Sniffmaster) or modem (Telesniffer).

The Network General style emphasizes a menu-based configuration approach and effective use of graphics to simplify displays.

We were able to obtain two of the monitor test data points from the Sniffer monitor screen. The screen does not show collisions or provide detailed error reports. Resetting the monitor required four keystrokes.

We found that the bar "speedometer" used to report utilization was more difficult to read than those of most of the other analyzers. There seemed to be some problem with the utilization software for the 16M bit/sec token ring; it did not function properly at high loads. We found the menu approach to selecting options easy to use but somewhat prone to error.

We found the new Series 700 Sniffer to be a little quicker in response than the Series 500. This is probably due to the difference between AT and Micro Channel Architecture bus performance.

■ **Novell, Inc.'s LANalyzer.** The LANanlyzer was very easy to use, and the preloaded applications were particularly impressive. The monitor screen showed a good mix of tabular and graphical data. Obtaining all of the data for our monitor test took one keystroke. Resetting the monitor took three keystrokes.

The new LANalyzer software is much easier to use than previous versions, thanks to a set of predefined applications that cover most of the basic LAN analysis functions. The LANalyzer is one of the few analyzers that can detect collisions and sense broken packets on the network.

No problems were detected during the tests.

■ **Spider Systems, Inc.'s Spider Analyzer 320.** The Spider Analyzer 320 was a good solid performer in both Ethernet and token-ring tests. It was one of the few analyzers that reported Ethernet collisions.

Analyzer statistics appeared on two screens, which were a keystroke apart. Restarting the Spider Analyzer 320 ideally requires three keystrokes, but it required seven keystrokes in our test because we couldn't easily determine how to save the setup file that instructed the analyzer to reset all statistics.

The Spider Analyzer 320 had the most problems keeping up with our Ethernet monitor stress test but didn't seem to have any problems with 4M bit/sec token ring.

We found the Spider's interface quite different from the other analyzers and from most software conventions. It shouldn't be a problem in a single-machine situation, but it takes time to get used to it.

■ **VANCE Systems, Inc.'s ATS 1000.** The ATS 1000 is similar in style and use to the HP 4972A. It has the best token-ring support of any of the analyzers reviewed and includes many applications unique to token ring that allow it to take advantage of token ring's built-in powerful management capabilities.

The ATS 1000 can view tokens and media access control frames, and can measure token rotation time. It is the only analyzer reviewed that can quite literally see everything on the cable due to its unique bit-slice network preselector.

The monitor screen reported all the data in tabular mode and was quite easy to read. Like the HP 4972A, the VANCE Systems ATS 1000 has a steep front-end learning curve but is quite easy to use once you get the hang of it.

We experienced one problem during the tests. In the 16M bit/sec token-ring high-stress monitor tests, the ATS 1000 experienced memory overload errors when the network load exceeded 50%.

We discussed the problem with VANCE Systems and were informed that this is a known problem with the 16M bit/sec monitor mode. The company said it will be fixed with a software change in the fourth quarter of this year.

— Colin Mick and Dan Nagel

Ethernet utilization monitoring

Figure 1

LAN analyzer performance under loads of 3, 6 and 12 stations

3 stations,653K bit/sec

Analyzer	Utilities shown	Number of collisions	Number of good frames	Errors
LANView	53.4%	NA	10,948	none
LANVista	49%	NA	10,946	none
HP 4972A	51.8%	529	10,948	none
Sniffer	50%	NA	10,948	none
LANalyzer	51%	453	10,948	none
Analyzer 320	50%	529	10,814	368 short

6 stations,816K bit/sec

Analyzer	Utilities shown	Number of collisions	Number of good frames	Errors
LANView	78.8%	NA	21,754	1 CRC, 6 align, 7 short, 7 bad
LANVista	73%	NA	21,711	none
HP 4972A	76.8%	10,529	21,751	none
Sniffer	75%	NA	21,753	NA
LANalyzer	77%	7,761	19,290	29 short
Analyzer 320	65%	10,496	18,896	7,011 short

12 stations,837K bit/sec

Analyzer	Utilities shown	Number of collisions	Number of good frames	Errors
LANView	82.5%	NA	43,330	11 CRC, 10 align, 21 short, 21 bad
LANVista	77%	NA	43,244	none
HP 4972A	80.2%	28,764	43,312	none
Sniffer	80%	NA	43,316	NA
LANalyzer	81%	19,512	38,048	61 length
Analyzer 320	68%	27,490	36,190	16,646 short

align - alignment
bad - bad packets detected
CRC - cyclic redundancy check
length - length
NA - not applicable
short - short packets detected

GRAPHIC BY SUSAN SLATER

SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

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tween otherwise similar products.

Data capture is a reactive function that helps the manager understand a problem or behavior on the network. The analyzer is programmed to save sample packets either in a random-access memory buffer or a disk so that they can later be decoded and examined.

The problem with data capture is that the capture buffers (the RAM used to store the packets as they are received) are not all that large, particularly when one considers that most LANs carry hundreds or thousands of packets per second. This means that a manager can either capture all of the packets on the network for a very short period of time or be very selective and capture a subset of the packets over a longer period of time.

In general, the trick in data capture is to be very selective. This is accomplished via capture filters and triggers and via slice control.

A capture filter is a template that the analyzer uses to select packets to send to the capture buffer. Templates can be based on send and receive addresses, protocol type, packet length and other characteristics. The packets can then be examined for various errors, and network performance can be charted over time.

The trigger is used to open and close the capture buffer. Triggers can be based on a filter (the occurrence of a packet meeting the template), a Boolean statement combining filters, the time-of-day clock or network utilization.

Slice control is used to specify the portion of the packet that is saved. This means you can capture more packets by saving only the first 128 bytes or so and slicing off the rest.

Once the packets have been captured, it is sometimes useful to be able to filter them before display. Most LAN analyzers offer display filters that use a template to select saved packets for display. Some analyzers also can search the capture buffer for a specified pattern.

Capture rate tests

To test packet capture, the analyzers were asked to report the number of packets captured and the completeness of the capture — that is, what was really in the buffer. Each typically measures errors as a percentage of total packets transmitted.

The size of the capture buffer limits the total amount of data that can be collected. However, as noted above, the volume and collection of data can be controlled by many variables, including triggers and filters.

For example, filters can be used to selectively capture packets based on address, protocol or size. Triggers can control the opening and closing of the capture buffer. The capture, or trace, buffers can be set to stop when full or to function in a first in, first out (FIFO) manner.

The amount of information saved per packet, or the slice, also can be controlled. Typically, either the first 128 bytes or the entire packet can be saved, although some analyzers offer variable-slice options. Also, some analyzers will either save directly on a disk or will save on a disk via the trace buffer.

For this test, the analyzers were configured to capture all of the traffic directly in the capture buffer. The analyzers were then bombarded with increasingly high data loads using Testmaster scripts. Once the capture was complete, the capture buffers were scanned to ensure that the packets were captured as represented.

All of the analyzers were able to keep up with our tests to the limit of their buffers. Those that did not have circular, or FIFO, buffers merely stopped capturing when they were full. Those that had circular buffers continued saving over the top of the oldest packets when their buffers filled.

Token-ring utilization and frame counts

Figure 2

4M bit/sec test run

		1 station	2 stations	3 stations	4 stations
IBM Trace and Performance (TAP)	utilization	38%	70%	80%	89%
	number of packets	NA	NA	NA	NA
Sniffer	utilization	42%	70%	90%	92%
	number of packets	2,967	5,124	7,753	10,080
Sniffer 700	utilization	42%	70%	90%	92%
	number of packets	2,936	5,125	7,750	10,012
Spider	utilization	40%	70%	80%	89%
	number of packets	2,803	5,325	7,700	9,598
VANCE	utilization	40%	70%	80%	89%
	number of packets	2,803	5,325	7,700	9,598

16M bit/sec test run

		3 stations	6 stations	9 stations	12 stations
TAP	utilization	34%	62%	77%	85%
	number of packets	NA	NA	NA	NA
Sniffer	utilization	35%	35%	35%	35%
	number of packets	7,045	9,275	11,182	13,356
Sniffer 700	utilization	39%	39%	41%	47%
	number of packets	7,617	9,158	11,090	14,197
VANCE	utilization	36%	memory overflow	memory overflow	memory overflow
	number of packets	7,650	1,173	467	585

NA - Not applicable

GRAPHIC BY SUSAN SLATER

SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

With appropriate selectivity — that is, with the triggers and filters configured as needed — and with buffer limitations accounted for, all of the analyzers tested should have no problems keeping up in packet capture mode. Our stress test represents the worst possible conditions and an absolute lack of selectivity.

The major difference we saw among the monitors was in how their buffers worked. We couldn't get the VANCE Systems ATS 1000 to work in FIFO mode; when it was full, it stopped. The Cabletron product typically lost 30 to 40 packets when it started through the circular buffer a second time and reported the problem in the trace. The other analyzers did not appear to indicate where the FIFO border was — that is, the place where the overwriting stops — in the trace.

Protocol recognition

Displaying packets in ASCII or hexadecimal numbering offers little management information for the uninitiated LAN user or manager. Protocol decodes — the ability to explain packet contents — are, therefore, an important feature in LAN analyzers.

This test used a special multiprotocol measure designed for gauging the performance of bridges and routers. This multiprotocol yardstick uses the transmission capabilities of the HP 4972A analyzer to transmit a file of mixed 60-byte, or data field, packets using five protocols commonly found on Ethernet LANs: Internetwork Packet Exchange (IPX)/Xerox Network Systems; the Department of Defense's Internet Protocol; Digital Equipment Corp.'s DECnet; Apple Computer, Inc.'s AppleTalk Phase 1; and Invisible Bridge.

The protocol analyzing capabilities of the analyzers were tested in two modes: monitor and capture (see Figure 3, this page).

To test for monitoring ability, the displays of all of the analyzers were set for standard monitoring; the screens were observed to see how many of the different protocols were detected and displayed.

For the capture test, the analyzers were switched to capture mode, captured a sample of packets and then displayed them in decode mode to determine which protocols were recognized and decoded. The purpose of this test was merely to verify decode ability, not to compare the decodes in detail, in order to check for differences in the decoding sophistication.

(continued on page 48)

Ethernet protocols in monitor and capture mode

Figure 3

Protocols seen in monitor mode

	Protocols broadcast				
Analyzer	**AppleTalk**	**DECnet**	**DOD/IP**	**IPX/XNS**	**Bridge**
LANView	AppleTalk	DECnet	TCP/IP	Novell	other
LANVista	NS	NS	NS	NS	NS
HP 4972A	NS	NS	NS	NS	NS
Sniffer	AppleTalk	DECnet	IP	802.3	other
LANalyzer	AppleTalk	DECnet	TCP/IP	NetWare	other
Analyzer 320	NS	NS	NS	NS	NS

Protocols seen in capture mode

	Protocols broadcast				
Analyzer	**AppleTalk**	**DECnet**	**DOD/IP**	**IPX/XNS**	**Bridge**
LANView	AppleTalk	DECnet	TCP/IP	Novell	other
LANVista	AppleTalk	DECnet	DOD/IP	Novell	Ethernet
HP 4972A	AppleTalk	DECnet	DOD/IP	IPX/XNS	other
Sniffer	AppleTalk	DECnet	IP	Novell	other
LANalyzer	AppleTalk	DECnet	TCP/IP	NetWare	other
Analyzer 320	AppleTalk	DECnet	DOD/IP	IPX	other

DOD - Department of Defense
IPX - Internetwork Packet Exchange
NS - Does not show protocols in monitor mode

Detection and decoding by analyzers can differ In monitor and capture modes. Some also show decoded protocols differently.

GRAPHIC BY SUSAN SLATER

SOURCE: LANQUEST LABS, SAN JOSE, CALIF.

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(continued from page 45)

Only three of the tested analyzers showed packet counts by protocol during monitoring: the Cabletron LANView, the Network General Sniffer and the Novell LANalyzer. (We later learned that the HP 4972A could also perform this task.)

All of the analyzers tested were able to recognize and decode the four primary broadcast protocols to some degree and were able to recognize the bridging protocol. Some of the protocol readouts, as shown in Figure 3, differed from the protocols actually sent and captured. This is due to the display programming of the analyzers. The information in Figure 2 is that which is displayed on the screens of the analyzers. For example, the Novell LANalyzer displays the IPX/XNS protocol detected as "NetWare" and the Cabletron LANView, among others, displays it as "Novell" when they are the same basic protocol.

Conclusions

All of the tested analyzers did their jobs competently at typical (less than 30%) operating loads. Each of the tested machines has its own user interface and style of use. Selection of LAN analyzers should be based on which machine provides the best combination of user interface style, operational approach and performance to meet the projected need.

For simple Ethernet LANs, the Cabletron LANView provides a good mix of functionality and ease of use. It had the best monitor screen and a very simple user interface that made it easy to use. However, it behaved strangely at high stress levels.

For large and complex Ethernet LANs, the Novell LANalyzer provides a good mix between the flexibility and ease of use of the Sniffer and the utility of predefined experiments like those of the HP 4972A. It provides an impressive set of capabilities including the ability to detect collisions and partial packets. Novell also offers a 4M bit/sec token-ring version of the LANalyzer; one was not available for this test.

For complex, multiplatform LANs, the best choice is the Network General Sniffer. The Sniffer offers the broadest support in terms of protocols and topologies. The monitoring and reporting functions added to the latest release of the software significantly improve this product.

We found the Sniffer 700, which is based on the new IBM PS/2 Model 70, to be a little faster than the 500, which is based on the Compaq Computer Corp. 386/20 portable; the 700 is currently only available for token ring.

The Digilog LANVista provides the best price/performance package for Ethernet LANs. We found the user interface slightly more difficult to master than the other analyzers, but it performed well. Its unique, distributed architecture makes it a good choice for simultaneous monitoring of

(continued on page 74)

LAN analyzer product information

Prices for the analyzers included in this test are shown below in kit form (adapter and software) and in stand-alone mode (adapter and software loaded in a portable computer).

Digilog LANVista
CXR Corp.
Montgomeryville, Pa.
(215) 628-4530
List price for LANVista 200, including one protocol suite: $6,495 in kit form, $13,495 with Dolch 386 computer

HP 4972A
Hewlett-Packard Co.
Colorado Springs
(719) 531-4420
List price: $18,350 (does not include protocols)

LANalyzer
Novell, Inc.
LANalyzer Products Division
San Jose, Calif.
List price: $9,980 in kit form, $19,950 and up for stand-alone, depending on personal computer choice

LANView
Cabletron Systems, Inc.
East Rochester, N.H.
(603) 332-9400
List price: $11,995 in kit form; also available stand-alone

Sniffer and
Sniffer Model 700
Network General Corp.
Menlo Park, Calif.
(415) 688-2700
List price: $12,500 in kit form, $24,000 stand-alone with Compaq Computer Corp. Portable III and 6M bytes of random-access memory (does not include protocols)

Spider Analyzer 320 and **320R**
Spider Systems, Inc.
Burlington, Mass.
(800) 447-7807
List price for 320 (Ethernet): $10,500 in kit form, $15,600 as stand-alone with Compaq 386 portable

VANCE/Bytex ATS 1000
VANCE Systems, Inc.
Chantilly, Va.
(703) 471-9402
List price: $16,995 for 4M bit/sec token ring, $19,995 for 16M bit/sec token ring; sold only in stand-alone form

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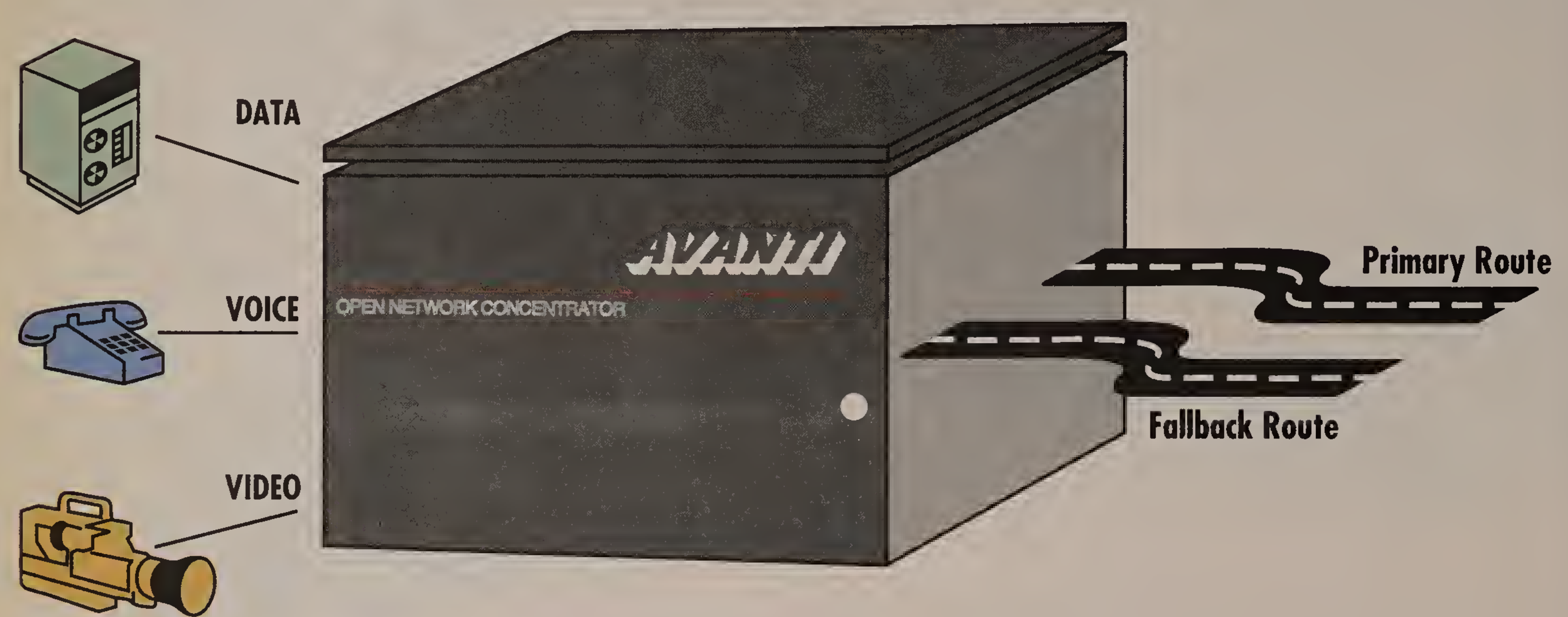

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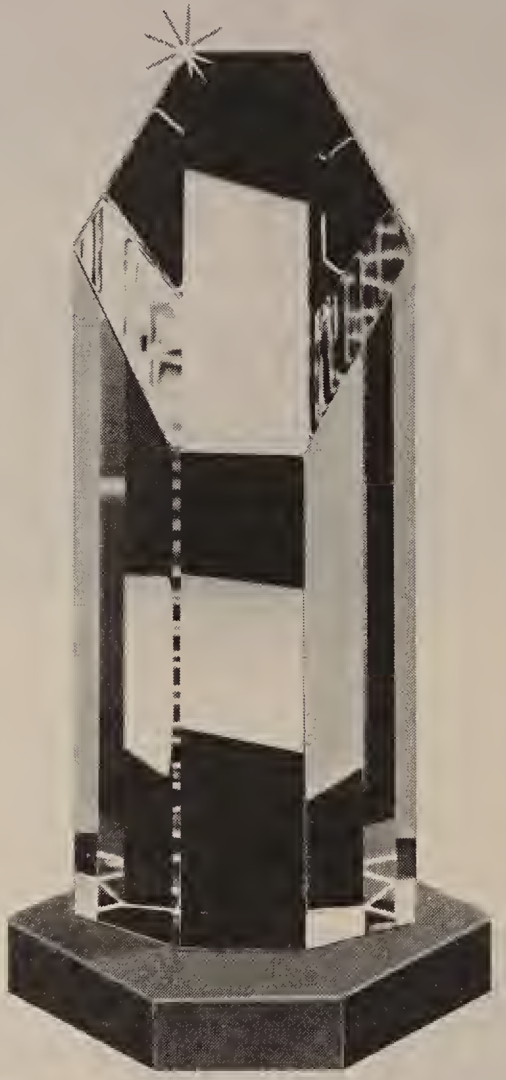

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The need for LAN benchmarks

Without standardized measures, network users can't easily tell what aspects of LAN performance to measure.

By SALVATORE SALAMONE

Gary Larson, creator of "The Far Side" cartoon strip, observes that anytime piranhas are mentioned, a benchmark that is always referenced is how fast they can skeletonize a cow. Unfortunately for network managers, whenever LANs are mentioned, there is no one measure or benchmark of performance that quickly comes to mind.

Local-area network managers are increasingly pressured to get the best performance from their LANs for the best price. However, determining the performance level of individual network components or of the end-to-end network itself is a problem, especially before the equipment is purchased and installed.

This situation is frustrating for LAN managers and systems integrators alike. They can argue about the benefits derived from adding or upgrading LAN components, but they have few tools to quantify the benefits.

If it were simply a lack of consensus as to which of a group of commonly known benchmarks should be used, network managers could choose one and justify their purchasing decisions based on its results. However, the task is not that easy; there is no consensus about what to measure, what performance means or what constitutes good performance.

Users almost universally agree that benchmarks are needed. One Fortune 500 net manager, for example, says that every

(continued on page 54)

Salamone is Network World's *features writer.*

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The Newsweekly of User Networking Strategies

Volume 7, Number 18 | An International Data Group Publication | April 30, 1990

U.S. to study Soderblom token patent

By Laura DiDio
Senior Editor

WASHINGTON, D.C. — In a move that could spell trouble for Olof Soderblom's token-passing patent and monetary relief to his 50 licensees, the U.S. Patent and Trademark Office has agreed to reexamine the validity of Soderblom's patent.

In its 1½ page decision, the Patent Office stated that the reexamination request from an anonymous vendor was granted in view of earlier patents issued to four engineers — including two from AT&T Bell Laboratories — before Soderblom was granted his patent in 1981.

"A substantial new question of patentability affecting Claims 25 to 33 of U.S. Patent No. 4,493,948 to Soderblom is raised by the request," the Patent Office statement said.

The 10 claims in question deal with open and closed data transmission loop schemes and are central to the issue of whether Soderblom's existing patent is applicable to today's token-ring and Fiber Distributed Data Interface local-area network technologies.

Invalidation of the patent or amending even portions of the patent could effectively render null and void the current licens-

(continued on page 62)

What's in a name?
DEC's Distributed Name Service (DNS) process

1. User attempts to store file.
2. Not recognizing name, DNS clerk routes request to DECdns server.
3. Server locates full file name and address, and sends data to workstation.
4. Application appends text to routing information and sends file.
5. Data is stored to Smith file on remote server.

GRAPHIC BY SUSAN J. CHAMPENY | SOURCE: DIGITAL EQUIPMENT CORP., LITTLETON, MASS.

DEC describes benefits of X.500 directory services

X.500 will extend DNS offering to incorporate non-DEC devices in DECnet Phase V directories.

Q&A Later this year, Digital Equipment Corp. is expected to announce DECnet Phase V, a major revision of its network software that will support the full suite of Open Systems Interconnection protocols.

According to Jane Brewer, DEC's product marketing manager for enterprise networking within DEC's Telecommunications and Networks Organization, one key component of that announcement will be support for the X.500 directory services standard, which promises to give network administrators greater control over the hardware and software elements in their networks.

In an interview with *Network World* Assistant Managing Editor Charles Bruno, Brewer described the full potential of X.500 directory services and laid out DEC's strategy to support the technology within DECnet Phase V.

(continued on page 59)

Microsoft to market LAN Manager direct

Software giant to sell NOS to Compaq resellers to stabilize LAN Manager camp, jump start sales.

By Laura DiDio
Senior Editor

REDMOND, Wash. — In an attempt to boost lagging sales of its LAN Manager network operating system, Microsoft Corp. last week announced it will sell a version of the product directly to select Compaq Computer Corp. value-added resellers.

Microsoft's decision to put its marketing muscle directly behind LAN Manager is viewed as crucial if the product is to compete successfully with Novell, Inc.'s NetWare, which commands 60% of the network operating system market today. LAN Manager has only been available through OEMs to date.

"By selling its own version of LAN Manager, Microsoft is giving users freedom of choice," said Craig Burton, executive publisher of the *Clarke Burton Report*, a monthly research magazine. "Users will no longer be constrained to buying versions of the product that only work with a particular OEM's hardware. This will help accelerate the acceptance of LAN Manager."

Jonathan Yarmis, vice-president of the personal computer service at Gartner Group, Inc. in Stamford, Conn., agreed. "The move solidifies and stabilizes the LAN Manager camp and will spur application development.

"Microsoft and its OEMs have to present a unified front, especially in light of Novell's merger

(continued on page 6)

Fax facts

Average:

Number of users per fax machine	10 to 50
Number of pages transmitted per day	15
Cost per page of transmission	35 cents
Cost per sheet of paper	5 cents
Cost of a fax machine	$1,500

GRAPHIC BY SUSAN J. CHAMPENY

Net execs try to tame fax monster

By Tom Smith
New Products Editor

The explosive growth of facsimile machines has created a costly monster of which few companies are aware, let alone able to control.

Most large companies don't even know how many fax machines they have or how much they are spending on dial-up fax transmissions.

"It's like trying to manage envelopes or pieces of paper," said Bob Craig, vice-president of international network planning for The Chase Manhattan Bank, N.A. in New York. "People don't think it's worth the cost of managing it."

Yet the costs can be staggering. Annual transmission costs can be in the tens of millions of

(continued on page 8)

NETLINE

AT&T TRIDOM plans to trial a pan-European VSAT network with two users. Page 2.

A TARIFF 15 USER is the loser in a heated battle between MCI and AT&T. Page 2.

VENDORS AIMING for FDDI interoperability form a testing consortium. Page 2.

3COM ELECTS Benhamou to the post of president. Page 4.

AMEX AWARDS MCI with a service contract that could be worth up to $100m. Page 4.

US SPRINT EXTENDS VPN services into international markets. Page 4.

PRIVATIZING TELECOM in Eastern Europe is a question of capital. Page 43.

NEWSPAPER

FEATURE

Telecom privatization will aid int'l users

By Norman Lerner
Special to Network World

Most countries — industrialized, developing, capitalist and socialist — are at some stage of restructuring their telecommunications systems in order to accommodate and take advantage of the great political and economic changes now sweeping the globe.

In many places, this restructuring is taking the form of privatization of formerly nationalized telecommunications systems. This important trend raises major questions for multinational users of telecommunications services, including: Where is this happening and why? How will it affect the way we do business? And what will be the long- and short-term effects on telecommunications services to and from these countries?

This article examines the trend toward privatization in

(continued on page 38)

The results are in and **Network World** is the clear leader. The 1990 Wall Street Journal/ICA Member Study is conducted among members of the prestigious International Communications Association (ICA), an organization whose representatives purchase $16 billion of information technology products and services each year.

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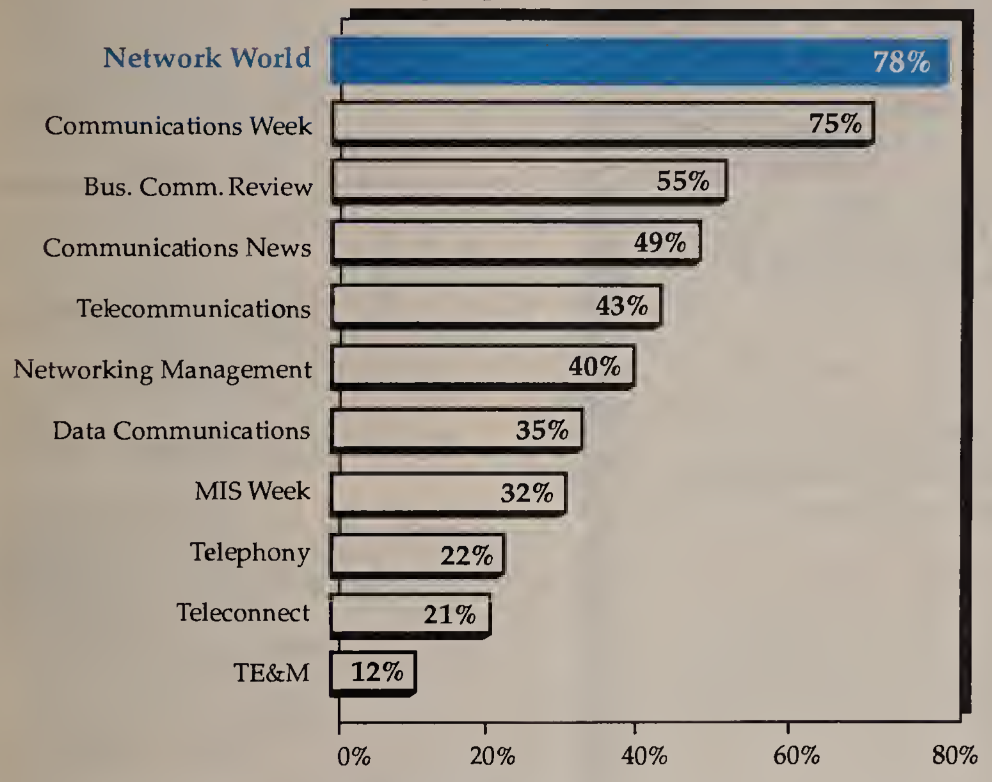
Domestic Regular Readership

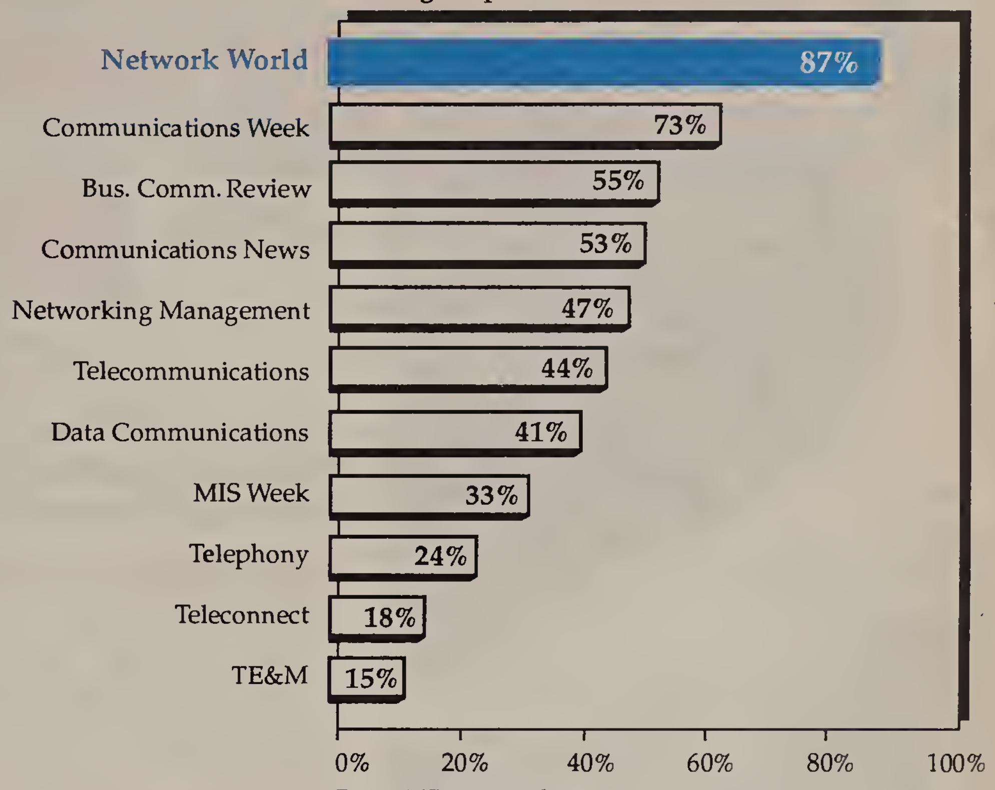
(Among Respondents with Domestic Networks)



Base: 336 Respondents
Regular readership is at least three out of four issues.

International Regular Readership

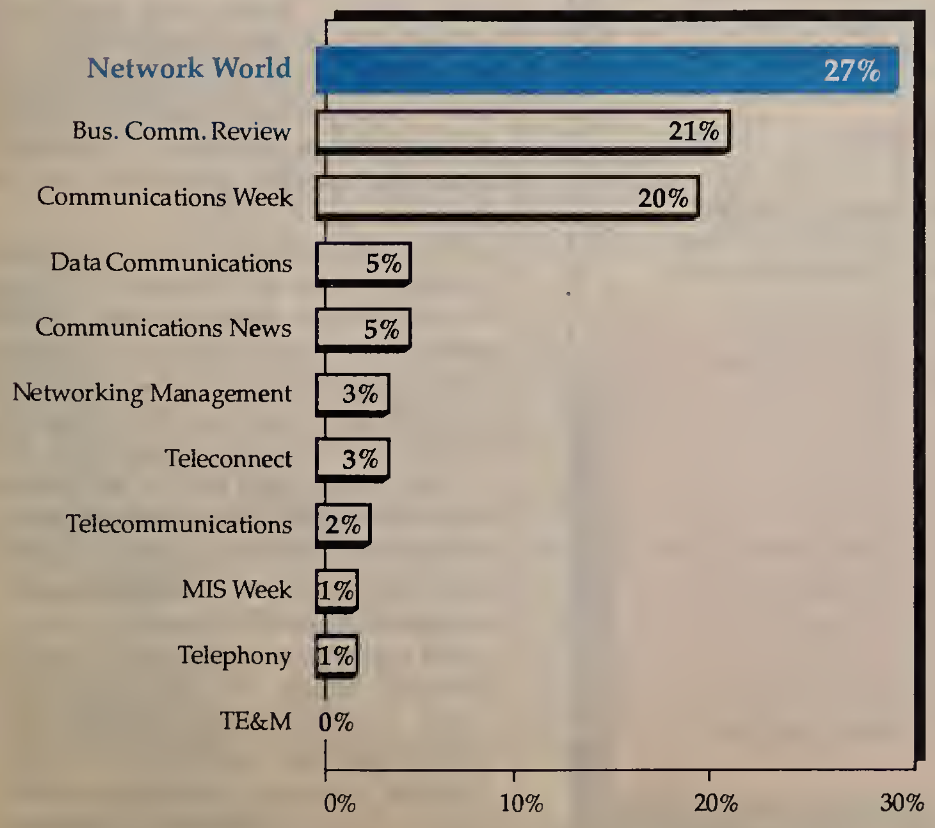
(Among Respondents with International Networks)



Base: 165 Respondents
Regular readership is at least three out of four issues.

Domestic
Most Important/Useful

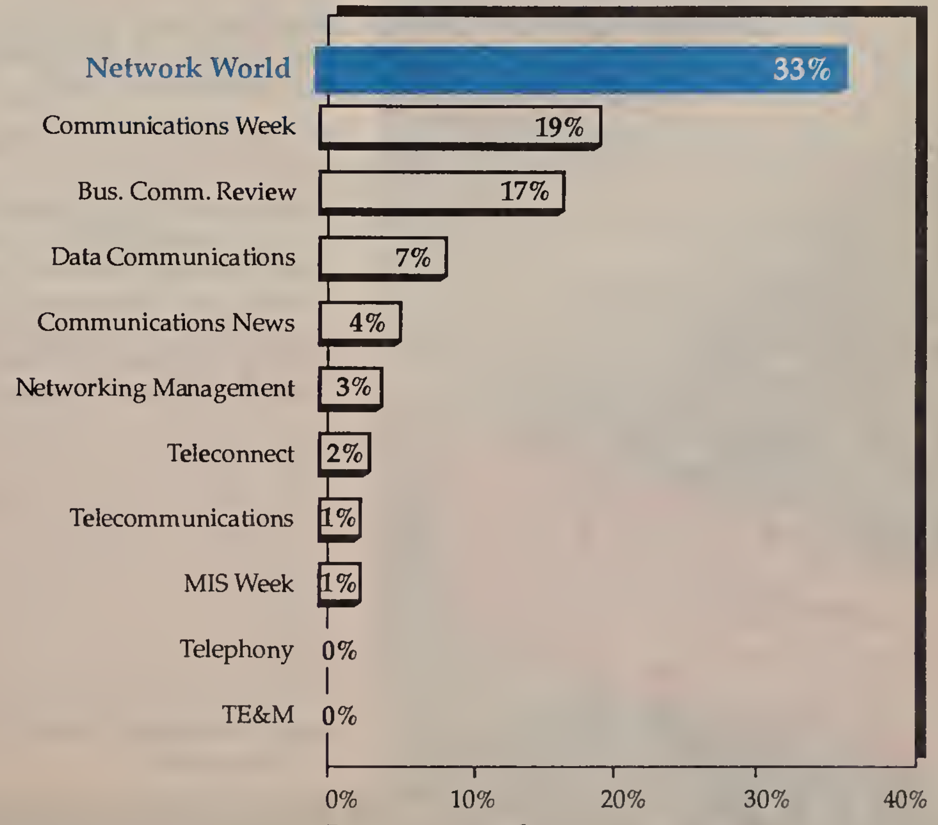
(Among Respondents with Domestic Networks)



Base: 336 Respondents

International
Most Important/Useful

(Among Respondents with International Networks)



Base: 165 Respondents

Source :1990 Wall Street Journal / ICA Member Study

(continued from page 51)

time he picks up a computer publication, he reads about the advantages of personal computers based on Intel Corp.'s 80486 chip over 80386-based machines.

The manager says he wants to know whether these reported gains in performance can be translated to network performance if he substitutes an 80486 server for his current 80386 server. The answer, unfortunately, is that nobody knows for certain if upgrading the LAN in this way will cause it to perform better.

Once equipment becomes part of a network, stand-alone comparisons of such characteristics as disk access speed, how fast files can be read and written to disk, internal data bus transfer rate and CPU speed become useless. Too many factors combine to determine how one device will interact with other LAN components.

For example, in a previous *Network World* LAN test ("Server upgrades offer big results at low costs," *NW*, April 23), it was discovered that LAN performance — as measured in response time and data transfer rate — could be improved dramatically by increasing a server's random-access memory, substituting the server's network interface card for one with a larger bus or increasing the amount of data contained in each packet sent out onto the network. These approaches are all much less expensive than buying a new server.

Balancing the pluses and minuses of switching to an 80486-based server or upgrading an existing 80386-based server is an example of the choices LAN managers and systems integrators face. A benchmark test that could rate a LAN's performance — whether measured as response time or throughput — would make the decision-making process much easier.

Performance

For most users, the definition of network performance is response time. In turn, the fundamental definition of response time is how long a user waits for a specific task to be completed.

Efforts to benchmark LAN performance fall into several categories.

First, there have been the vendor-generated benchmarks. Such tests are fairly narrow in scope, usually focusing on one LAN component such as network interface cards or operating systems. Since the vendors publish very little information about the test criteria used in these cases, users tend to be skeptical about the results.

David Crawford, network coordinator for California State University in Northridge, says, "If a test compared Novell's NetWare to 3Com [Corp.'s] 3+Open, we would be suspicious of a benchmark that came from one of those two vendors."

A second type of performance benchmarking test is the application test. Generally, such tests focus on one product or a group of similar products such as data base management software. The tests usually measure how fast a user can search for and access information on a server, how fast a small or large file on the server can be transferred to the workstation and how many transactions such as data base queries can be performed in a specified time. An example of this class of tests is TP1, a commonly used financial industry benchmark that measures on-line transaction processing system performance.

Group efforts

Several industrywide benchmarking efforts are currently under way as well. The Benchmarking Methodology Working Group is a committee of Internet members who are developing a set of standard definitions for product categories, product characteristics and benchmarks for testing these products. The group, coordinated by Scott Bradner of Harvard University in Cambridge, Mass., includes about 30 manufacturing companies, users and academics.

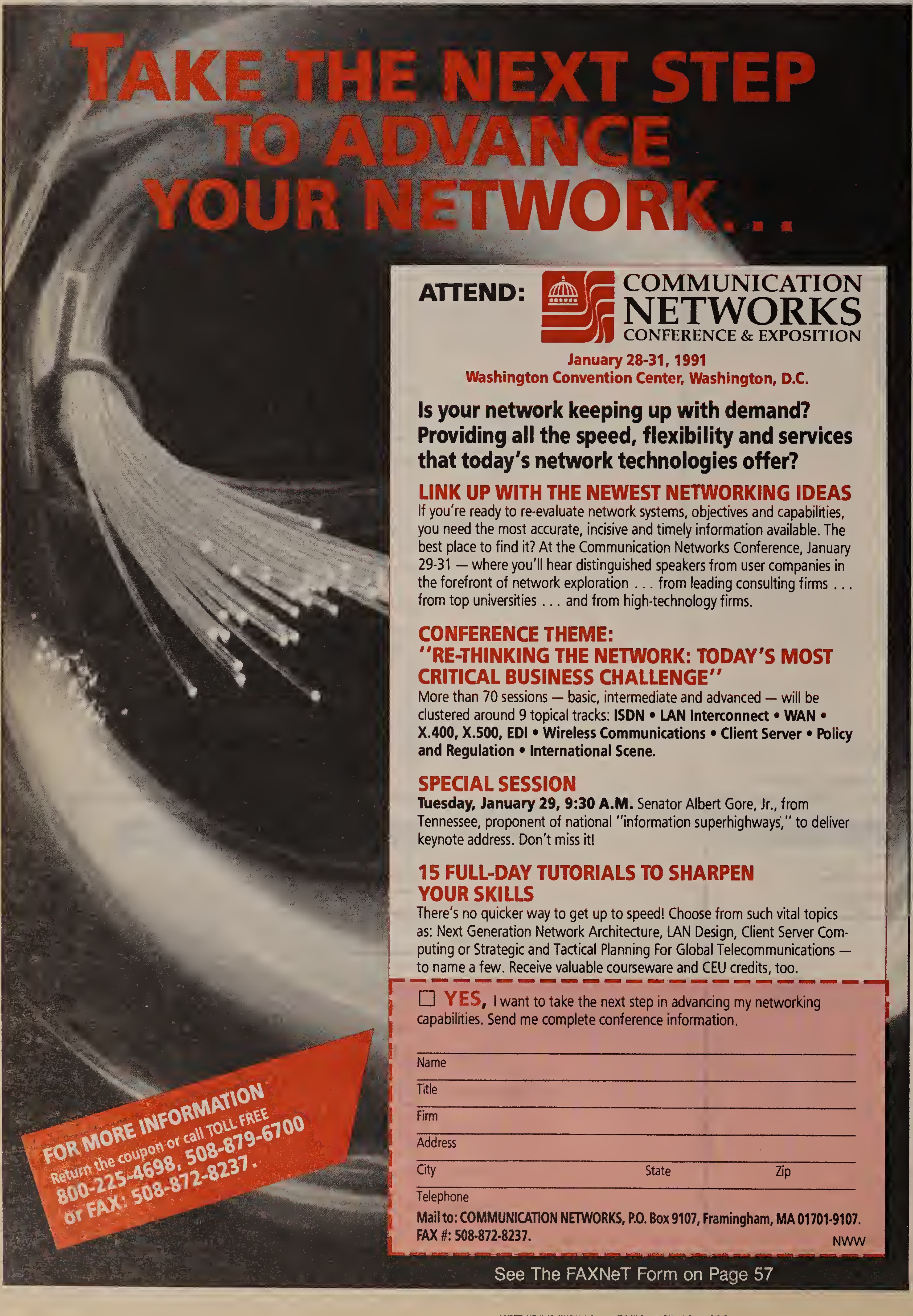
> "If a test compared Novell's NetWare to 3Com's 3+Open, we would be suspicious of a benchmark that came from one of those vendors."
>
> ▲▲▲

A second group, the California-based Systems Performance Evaluation Cooperative (SPEC), focuses on component benchmarking — for example, measuring the performance of one computer subsystem — and system-level benchmarks that measure the performance of multiuser LANs and simulate multiuser environments.

While such group efforts at establishing benchmarks may provide users with helpful information about network performance, many users would prefer benchmarks developed by even more objective standards groups such as the Institute of Electrical and Electronics Engineers, Inc. or ANSI. Some users believe the government should get involved in benchmarking and issue LAN performance ratings similar to the Environmental Protection Agency's mileage rating on all new cars.

But many in the industry do not believe standards bodies are the appropriate groups to develop benchmarking standards because they tend to proceed slowly while the technology is changing rapidly. The fear is that benchmarking standards

(continued on page 56)



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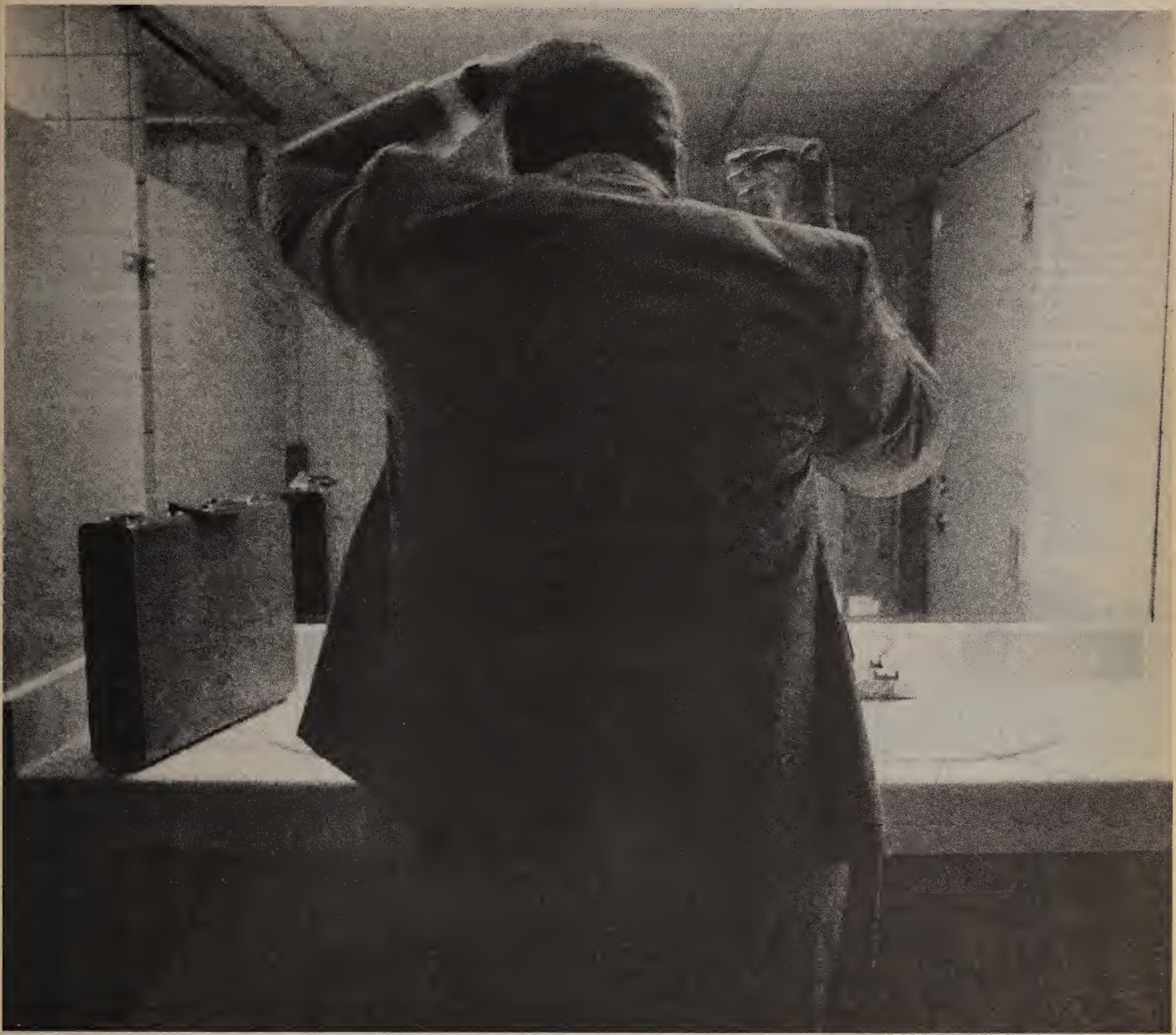

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(continued from page 54)

would be outdated before they are done.

Last fall, Ed Curry, president of Lone Star Evaluation Laboratories, Inc. of Georgetown, Texas, tried to organize a LAN benchmarking and performance technical committee within the IEEE. Curry, feeling the need for more broadly based user input, abandoned his efforts through the IEEE in 1989.

However, he and others opted to pursue an independent industrywide approach — the Performance Testing Alliance (PTA). PTA, which holds its first meeting at this week's NetWorld '90 show in Dallas, is an agglomeration of end users, vendors and several trade publications that seeks to establish public domain test methodologies.

Every LAN component comes in a variety of prices and performance. For example, Ethernet network interface cards are almost considered a commodity item, yet they are available in a variety of data bus sizes, offer several I/O schemes and can be purchased with varying amounts of on-board memory. All of these factors influence LAN performance and the price of the card.

Perhaps, then, one of the more important uses for benchmark tests is product stratification — grouping together products with similar performance characteristics. "Benchmarks allow people to look at a range of products and basically state, 'Since I really don't need something super fast, I don't want to pay for speed. [I'll buy] a moderately performing product that meets my needs,' " Curry says.

Neal Nelson, president of Neal Nelson and Associates of Chicago, agrees that benchmarks are needed for price/performance comparisons.

"They are needed today because there are different architectural options that have tremendous price/performance differences between them," Nelson says. "The classic examples are DEC and IBM, each of which have three different segments [mainframes, minicomputers and microcomputers] in their product lines. If you just look at the performance of those machines, there are price disparities of a 10-to-1 ratio."

Nelson and others assert that there are no usable benchmarks to prove an actual decrease in the cost/performance ratio when moving applications from mainframe- or minicomputer-based applications to LAN-based applications.

"If benchmarking goes on to become benchmarking across architectures — for example, a multiprocessor-centralized architecture vs. a distributed architecture — I wouldn't be surprised if LANs show up to be comparable in performance, more expensive or maybe comparable in price, and a lot slower [than mainframe- or minicomputer-based applications]," Nelson says.

Benchmarks for buying

Benchmarks could also help end users make purchasing decisions based on performance distinctions by enabling them to dig deeper into the performance features each product offers.

For example, network interface cards from different vendors may have similar throughputs in a benchmark test, but the test may further reveal that, due to more on-board RAM or a more sophisticated driver, one may out-perform the others in certain applications.

Cal State's Crawford would be particularly interested in seeing the establishment of benchmarks for justifying purchases. "We need benchmarks for equipment justification and for justifying distinctions between equipment," he says. "Benchmarks would be useful to us so that we could go to the purchasing department and say, for example, that we need 16-bit Ethernet boards because such a system performs X% faster than one with 8-bit boards."

> "Benchmarks serve to reduce the amount of work a customer has to do by reducing the field of vendors."
>
> ▲▲▲

Some people, such as AT&T Data Systems Group's district manager Sivaram Chelluri, see benchmarks as a way for users to "make a first cut," or limit the number of choices before doing more extensive tests on a particular LAN component. "Benchmarks serve to reduce the amount of work a customer has to do by reducing the field of vendors that [LAN managers] need to deal with," he says.

Chelluri says he believes the managers will not decide on a specific product or vendor based on the benchmarks alone. After narrowing their choices, managers should count on customized work with particular vendors testing specific applications and work loads to determine which products are best, he says.

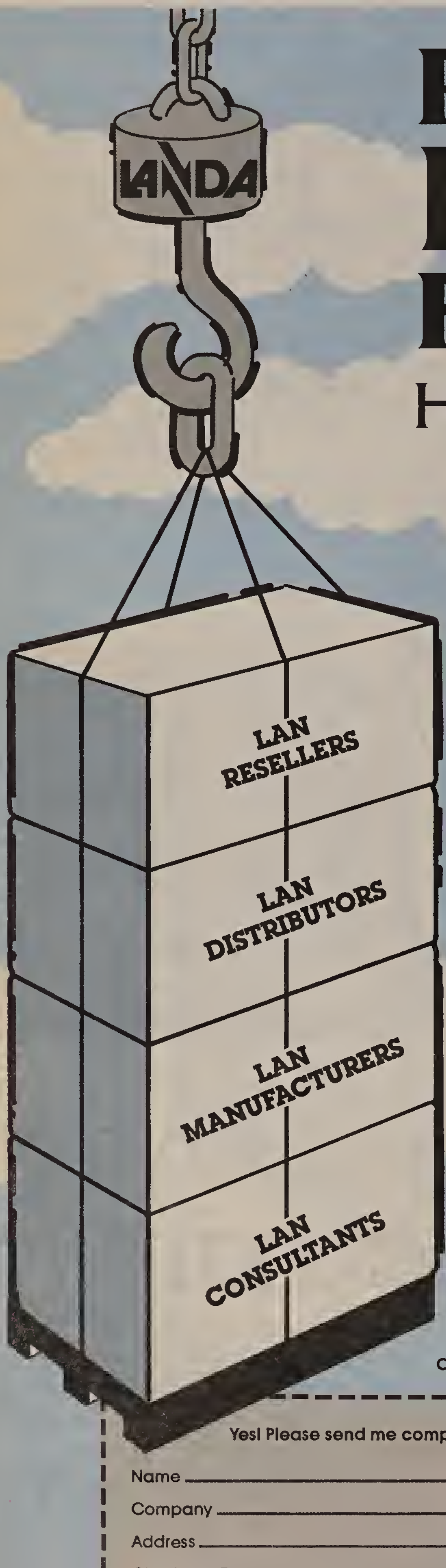
What should be measured?

As noted earlier, there are many opinions but no consensus as to what a benchmark should measure.

"There are no metrics today for measuring overall network performance," explains Richard Sterry, vice-president of product marketing at Microcom, Inc. and a member of the Benchmarking Methodology Working Group.

According to Steven Guengerich, direc-

(continued on page 73)



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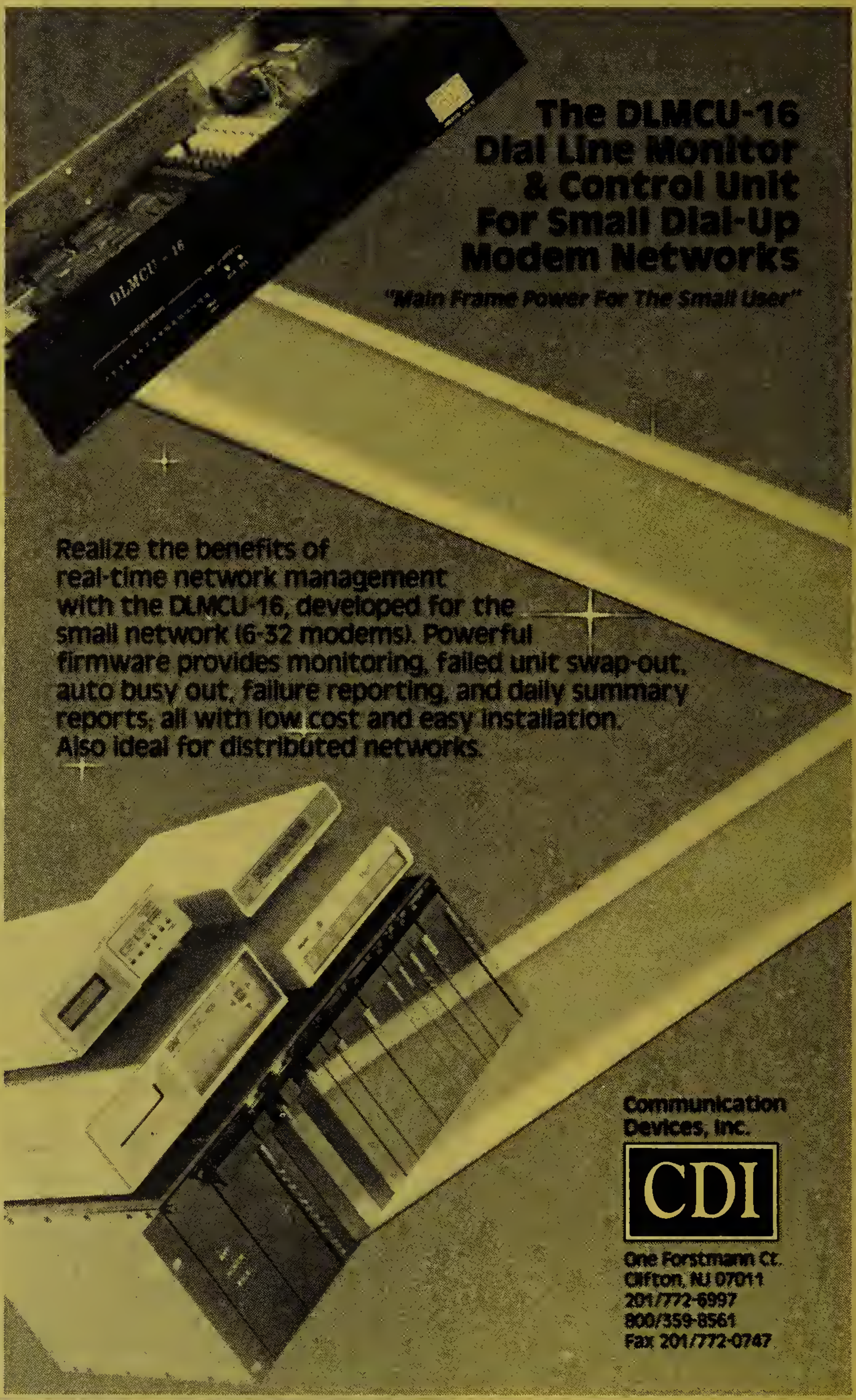

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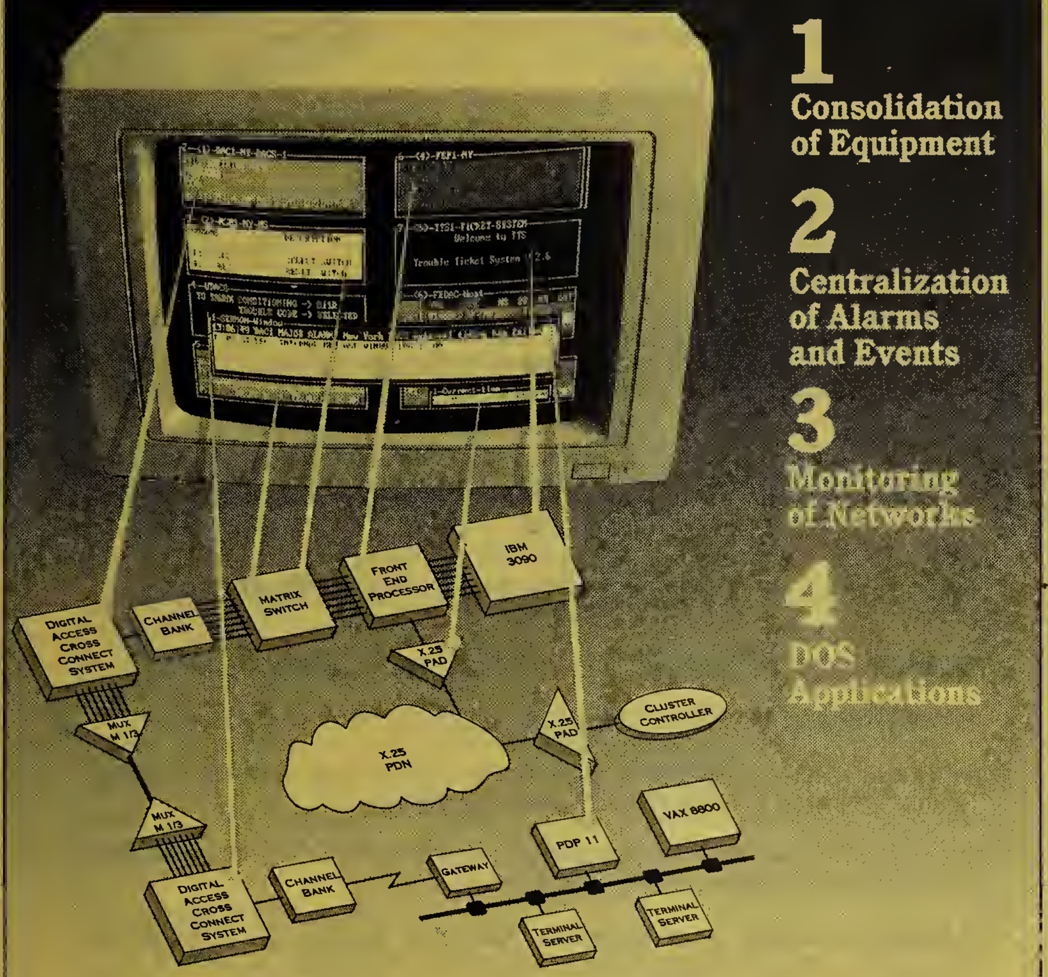

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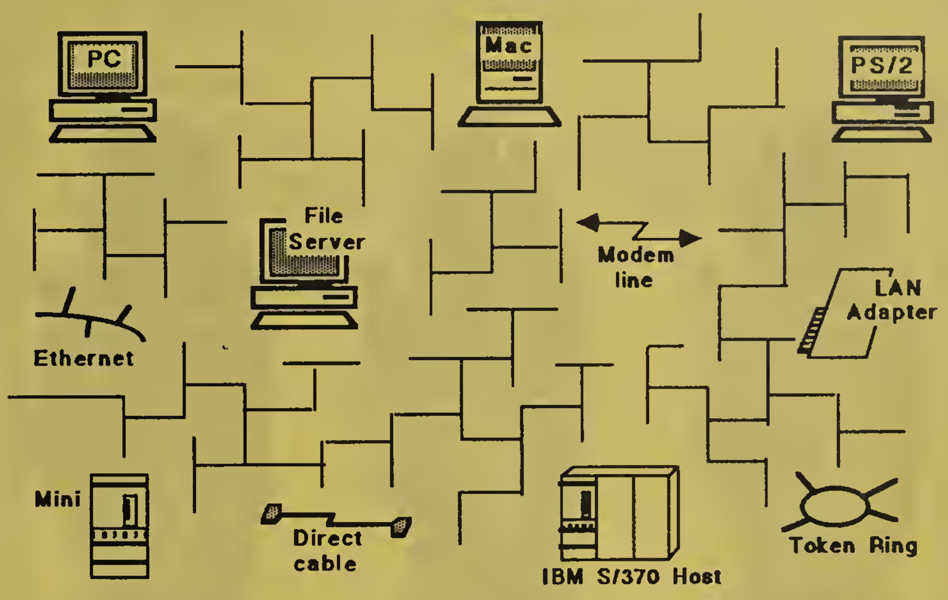

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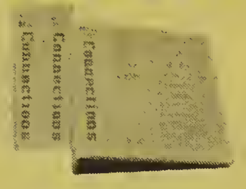

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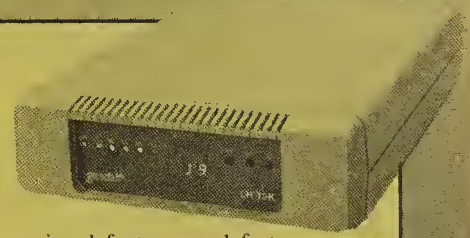

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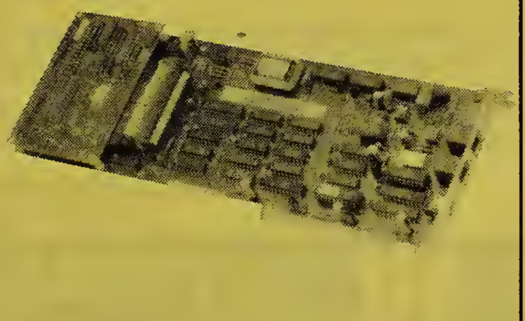

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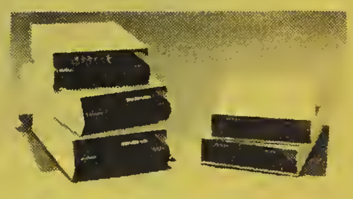

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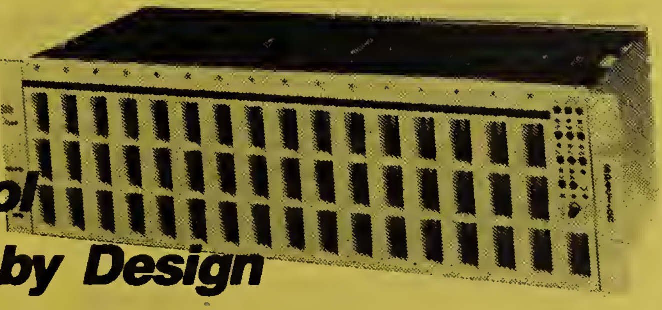

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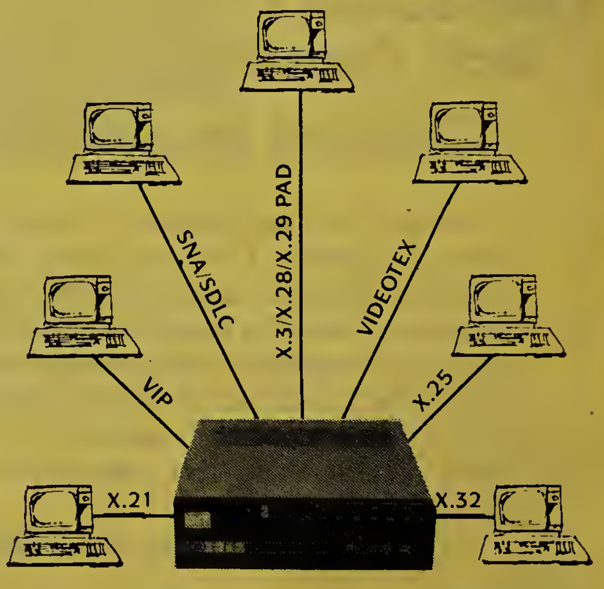

Demonstration model will be presented at TCA Booth #509.

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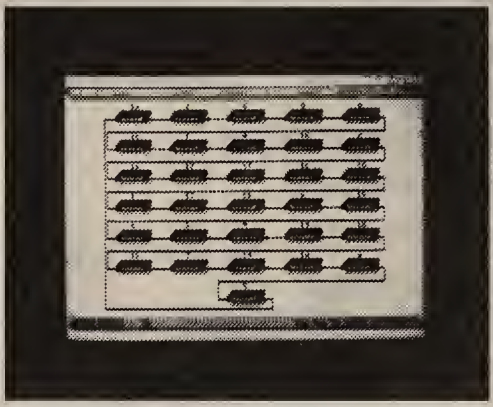

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2. SNA Fundamentals - 2 Days, $750.00
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3. APPC/LU 6.2 - 2 Days, $750.00
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(continued from page 56)

tor of BSG Communications, part of the Houston-based Business Systems Group, Inc., benchmark tests should be developed to measure loads that are typical for Fortune 500 business LANs. He also agrees with the idea that benchmarks should be used for product stratification — to measure and compare performance of products with similar specifications.

Benchmarking the whole

Guengerich's statements illustrate the two main schools of thought in LAN benchmarking: end-to-end and component performance testing. Within each camp, there is a great range of opinions as to what should be measured in a benchmark test.

For end-to-end performance tests, Colin Mick, LanQuest Lab's vice-president of operations, says he believes benchmarks should measure various aspects of network performance — such as throughput and response time — under precisely controlled conditions. "The goal is to isolate the impact of individual components," Mick says.

Perhaps the best way to do this is to set up a control network whose performance can be compared to the performance of an identical network with one component switched. In addition, the benchmark must be designed so that the impact on overall LAN performance due to a single component under different network traffic loads or under different applications is tested.

Benchmarks for end-to-end performance are difficult to establish because the behavior of complex nets can change depending on the conditions in which they are expected to perform.

According to George Koshy, a senior consultant at BBN Communications Corp. of Cambridge, LAN performance depends not only on the load on the network, but also on the type of traffic it carries and the types of applications for which it is used.

For example, is the traffic mostly bulky file transfer, or is it small packet transactions? "Depending on which it is, it can significantly affect the performance," Koshy says.

"My suggestion would be to build [benchmark] tools that measure application-to-application-level performance under predefined laboratory conditions," he says.

For example, under specified network loads, how many kilobytes of file transfer can occur in a second, or how many transactions can be processed in a second? Before the test, Koshy says, a user would specify the net configuration, the machines used, the operating system and the test methodology, thereby deciding before the test is run if it will be appropriate for comparisons.

> "The goal is to isolate the impact of individual components," Mick says.
>
> ▲▲▲

However, not everyone is convinced that end-to-end tests are always useful. "One of the artificial things about benchmarking is they give you only one situation to benchmark against," says Richard Carlson, program engineering manager at Centel Federal Systems, Inc., a Reston, Va.-based systems integrator.

For instance, a test can specify the number of users, the particular application and the network operating system. "As soon as you change something in that scheme, you are really violating what that benchmark means," Carlson says.

Benchmarking the parts

Component benchmarking can help users and testers avoid the complexities that arise when attempting to define useful end-to-end tests. However, component testing has its drawbacks.

Some benchmarking tests, for example, measure component performance simply as throughput expressed in packets per second. However, if the size of the packet is never defined, the results may incorrectly indicate that one product offers higher performance than another.

One bridge, for instance, may transfer fewer packets per second than another bridge, but each packet it transfers may contain twice as much data. If the throughput is measured in bits per second, the poor performer could come out ahead.

LAN component manufacturers have exploited the nuances in measurement terminology for some time. Vendor-based benchmarks have long been used to show users how one product outperforms another. However, there are no standards on which these tests are based (see "Will benchmarks improve LAN products?" this page). As a result, users have rightly been leery of their value.

The Benchmark Methodology Working Group is trying to eliminate some of the confusion brought about by the widespread use of benchmarking jargon and the resulting discrepancies among vendor claims. To this end, the group is producing a dictionary of terms and criteria for testing interconnection devices.

Group member Sterry says the group's first step must be agreement on a definition of performance. "Is it packets per second, or is it characters per second?" he asks. "You have to decide things like that before you can do benchmarks." The group plans to publish its first set of criteria by the end of this summer.

Sterry points out that once this first step is taken, testers can begin taking bigger ones. "I'm a proponent of end-to-end measurement," Sterry says, "but that's a pretty big step because you have so many components in an end-to-end measurement."

Benchmarking LANs will not get any easier in the future. As im-

(continued on page 74)

Will benchmarks improve LAN products?

Standardized benchmarks may help vendors by giving them a performance blueprint to follow when designing local-area network equipment. Manufacturers currently use customized benchmark testing when they are developing products.

"The results help them tune their design," says Colin Mick, vice-president of operations at LanQuest Labs in San Jose, Calif. "And this leads to better LAN products."

"Benchmark tests keep manufacturers on their toes," says Paul Datoli, vice-president of NetVision, Inc., a Burlington, Mass.-based systems integrator. "It forces them to build quality products."

Indeed, vendors use internal benchmarks to see how their products measure up to the competition.

One problem today is that most vendors use their own testing methodology. This often makes direct comparisons of competitive products virtually impossible. "Right now, every vendor seems to use a different metric when evaluating their products," says Richard Sterry, a member of the Benchmarking Methodology Working Group and vice-president of product marketing at Microcom, Inc. "The only way for me to compare my products to someone else's is to run a canned benchmark and actually pit the boxes against one another."

Some vendors, realizing the importance of benchmarking tests, are turning to independent organizations or labs to perform benchmark tests of their own products. For example, Racal InterLan, a manufacturer of LAN hardware and software, had Arthur D. Little, Inc., a Cambridge, Mass.-based consulting firm, design and benchmark test some of its products.

Robert Nerz, director for the software product line at Racal InterLan, says he believes more vendors will offer benchmark test results for their products. "It's an added dimension of competition," he says.

"If we can come up with standardized benchmarks — ones that everyone agrees demonstrate significant aspects of LAN performance — vendors will be able to dedicate engineering staff toward addressing those areas of performance where their product is falling behind," says Ed Curry, president of Lone Star Evaluation Laboratories, Inc. in Georgetown, Texas.

In addition to providing a way to compare LAN equipment against existing products, benchmarks give vendors a way to accurately measure their products against emerging technology. However, even if vendors can agree on standard tests that compare products in the development stage, some users are still skeptical about whether the resulting products will be better.

David Crawford, network coordinator for California State University in Northridge, asks, "Will some vendors design products that somehow beat the test, getting high ratings yet performing poorly in a real-world application? Or will vendors simply try to meet the test criteria, neglecting innovative implementations of new technology [because they fear] such products may not get as high a rating?"

Most industry insiders believe the tests can be designed so vendors cannot get around them. "It is possible to tune products to work better on one performance test than another," Mick says. "However, there are performance measures that are fairly well known in the way they behave, making it harder to beat the test."

According to Sterry, there should be ground rules for the performance tests. "For the groups that determine what the benchmarks are, it's very important that they set the rules down so that the benchmarks are an accurate measure of performance vs. something you can fool with," he says.

To be useful, benchmarks must span a variety of applications, configurations and architectures. "If vendors perform well on all those benchmarks, I would think they would also do well with applications," says Sivaram Chelluri, district manager at AT&T Data Systems Group in Lisle, Ill.

This was not always true. About four years ago, several vendors fine-tuned the design of network adapter cards specifically to perform well in a certain performance test, according to sources in the testing industry.

In addition, the benchmarks — and the testing — should be performed by an outside, objective agency. "A lot of today's benchmarks are done by independent agencies," Datoli says. "When the manufacturers were doing them, the results were biased."

Responding to user pleas for open tests, vendors are grouping together to develop industrywide benchmarks.

One such effort is the Benchmarking Methodology Working Group, a committee of Internet members charged with formulating a set of standard definitions of product categories, product characteristics and benchmarks for evaluating those characteristics. Another organization is the Systems Performance Evaluation Cooperative (SPEC), a group of computer equipment vendors and users focusing on component and system benchmarks for the performance of multiuser LANs and environments.

The reception that vendors have given to such industry efforts has been positive, according to both Sterry and Chelluri. "At least now, because of [SPEC], there is some agreement among the computer systems manufacturing vendors as to what the standards are and how we want to abide by those standards," says Chelluri, who is also AT&T's representative to SPEC.

While users welcome the move to industrywide standards, there is a catch: These standards reflect only certain subcomponents of today's LANs.

For instance, Release 1 of the SPEC benchmarks is specific to CPU and memory subsystem tests. And the Benchmarking Methodology Working Group plans to define performance and develop specific tests for network interconnection products.

Component benchmarks are a good first step, and many users would like to see industry groups eventually develop end-to-end benchmarks. They may come, but component performance tests must be fully developed first.

For the benchmarks to be meaningful, the process of developing them must be laboriously slow and thorough. According to Sterry, "People in the group are having a hard time coming up with [performance] definitions that everyone can agree on."

— Salvatore Salamone

Benchmarks

continued from page 73

aging LANs and transmission of video over LANs become more popular, benchmarks will need to address the large amounts of data transmitted by such nets.

"Benchmark tests should measure throughput by type of information — audio, data and video," says Paul Datoli, vice-president of NetVision, Inc., a Burlington, Mass.-based systems integrator. "You don't see much coverage today pertaining to video on LANs."

What users usually consider high throughput, such as Fiber Distributed Data Interface's 100M bit/sec, doesn't mean much if the user must wait 15 minutes for an entire image to appear on-screen, Datoli says.

As LAN users move to more data-intensive applications, such as imaging or video, performance issues will become more important and the need for comparative measures of network components and systems will become even more urgent. That means network managers and systems integrators will be looking for their equivalent of a skeletonized cow for years to come. ◻

Testing the LAN testers

continued from page 48

multisegment Ethernet LANs.

The Spider represents a good, basic system for dealing with Ethernet and token-ring environments.

Its user interface seemed to be the most difficult to master, but it does the job effectively.

The Spider would be a good choice for a smaller organization that needs Ethernet and token-ring capabilities as it is the only analyzer tested that can simultaneously monitor Ethernet and token-ring networks. At this time, it only supports 4M bit/sec token ring.

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Regardless of your choice, we strongly recommend using the analyzer with a color monitor whenever possible.

Although analyzer packaging tends to stress portability, we find that color displays make them easier to use. ◻

Letters

continued from page 37

The decade discrepancy that Schmied mentions was a typo that inadvertently occurred during the editing process.

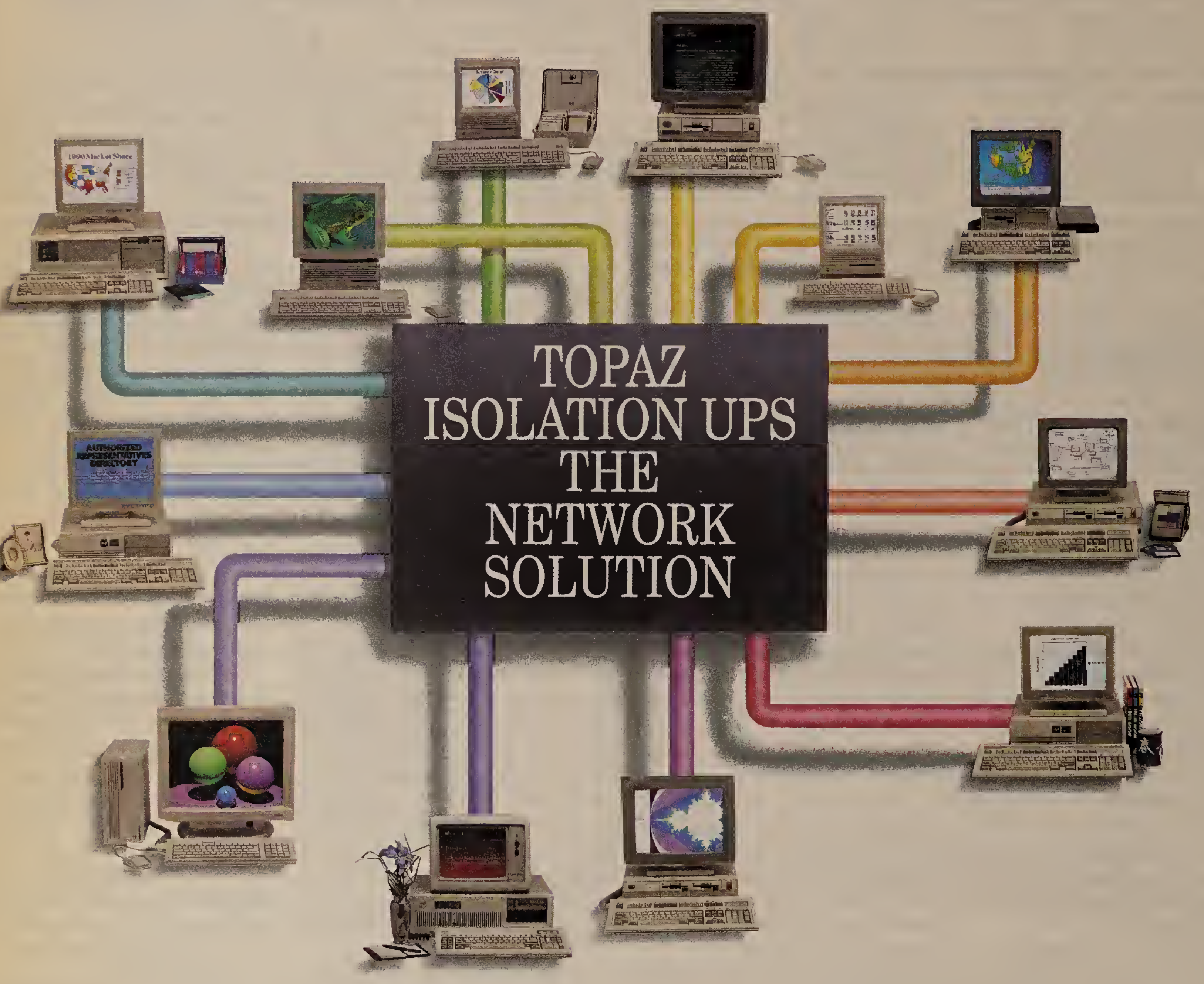
Actually, to imply that IBM was the inventor of the personal computer is to ignore true history. In point of fact, the first commercial personal computer was the Altair, Inc.'s Altair system, an even cruder and less "business-ready" configuration than the early IBM machine Schmied refers to in his letter.

A second important point, which Schmied seems to have overlooked completely, is the fact that "Alligators in the Swamp" articles are intended to help solve "unforeseen problems that can put the bite on your network." The article intends in no way, shape or form to propagate the notion that a 640K-byte DOS-based workstation is the ideal LAN workstation.

The issue with which the article deals is not what makes an ideal workstation, but rather how to solve a serious limitation that users of most DOS-based LAN workstations will eventually encounter.

Regardless of Schmied's very plausible arguments about the dropping prices of computing power and the value of users' time, the DOS-based personal computer is still the predominant LAN workstation in use today.

James Cavanagh
Regional applications engineer
StrataCom, Inc.
Atlanta



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See The FAXNeT Form on Page 57

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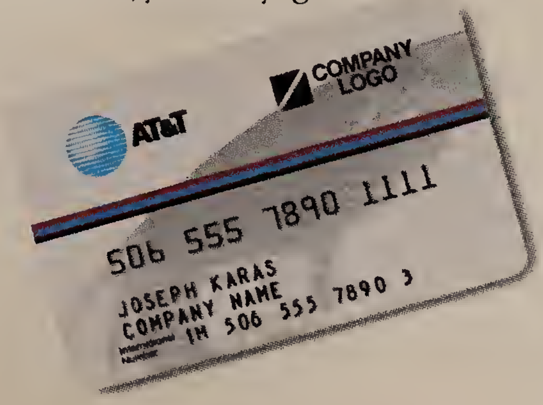

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Standards to bow with shortcomings

continued from page 2

approval, which is expected to take place by November.

As initially released, however, the standards will lack adequate audio compression, meaning Px64 videoconferences carried over bandwidths of less than 128K bit/sec will most likely require separate voice links.

Separating the voice from the video transmission could result in synchronization problems.

Lower picture quality

In addition, the picture quality of Px64 communications at bandwidths lower than 128K bit/sec is not expected to be very good, and the Px64 standard will offer no way for users to send high-resolution still images over video links.

These limitations, combined with relatively low user interest in interoperable codecs, should limit use of Px64 until at least 1992, when new versions of the standards are expected to be approved.

"Of course, there are a few hardy souls that'll jump out there right away, but I don't think there's going to be widespread use of Px64 until the new standards are out," said Al Lill, who covers the videoconferencing market for Gartner Group, Inc., a market research firm in Stamford Conn.

Richard Windrow, videoconferencing program manager at Martin Marietta Corp. in Bethesda, Md., said, "We fully support the standards process and think it's great for the industry, but we probably won't install Px64 for a couple of years. As with any new technology, there's going to be some things that will have to be worked out."

According to Jonathan Zingman, a staff scientist at Compression Labs and the company's representative to the CCITT, the reason so many features will be missing from the initial release of the Px64 standards is that a lot of the necessary work hasn't been finalized yet.

For example, Zingman said that a separate CCITT standards group is still in the process of preparing a standard for compressing audio signals into bandwidths as low as 16K bit/sec.

As a result, Zingman said Px64 standards groups had to use an existing CCITT standard for transmitting audio signals at bandwidths of 48K, 56K or 64K bit/sec in order to get the Px64 standards out by the July deadline.

This means that users conducting Px64 videoconferences at 128K bit/sec or less will probably be required to maintain separate links for voice communications. This is because voice traffic at 48K, 56K or 64K bit/sec would chew up so much of the 128K bit/sec videoconferencing bandwidth that the picture quality would be unacceptable.

Standards for holding two-way videoconferences between multiple codecs and for communicating high-resolution still images between codecs also have yet to be completed, Zingman said. He added that standards supporting these two videoconferencing features, as well as 16K bit/sec compressed voice, should be completed by 1992, which is the next time the CCITT will meet to approve standards.

Vendor support

Most vendors say they plan to support Px64 shortly after the standards are finalized.

For example, market leader PictureTel Corp. says it will add Px64 support to its codecs within 30 days of formal adoption of the standards. Products that support full Px64 picture quality and communications speeds higher than 384K bit/sec will not be available until nine months after the standards are adopted.

Compression Labs, Inc., which is close to PictureTel in the fight for the top spot in the U.S. videoconferencing market, will offer Px64 upgrades within six months of adoption of the standards. Prices for the upgrades are expected to range from $6,000 to $28,000.

Gartner Group's Lill predicted that once the full-featured Px64 standard is available, use of videoconferencing will proliferate. Within a year or two of the standard being available, Lill forecasted that low-end codecs will decline in cost from the current price of about $30,000 to less than $1,000, causing the market to take off.

Prices will decline because of the emergence of new low-cost chipsets from companies such as Intel Corp., thereby dramatically reducing the cost of building codecs, Lill said. ◼

> "Of course, there are a few hardy souls that'll jump out there right away, but I don't think there's going to be widespread use of Px64 until the new standards are out," said Al Lill, who covers the videoconferencing market for Gartner Group, Inc.

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AT&T grants Tariff 12 concessions

continued from page 1

deals. Since signing its original Virtual Telecommunications Network Service (VTNS) contract, a three-year deal with a $9.9 million minimum annual charge, CSX has negotiated a series of items from AT&T, including its own AT&T billing manager and a new method for assessing monthly minimum charges.

"We are very pleased with the flexibility and willingness AT&T has demonstrated in addressing our needs," said James Reed, CSX's telecommunications manager. "We don't have all the freedom we'd like, but we're moving in the right direction."

Billing woes

Like many of its predecessors, the first problems CSX encountered with its VTNS were with billing. Although the company's 500-site VTNS option took effect last March, CSX did not receive its first complete Tariff 12 bill until July. AT&T estimated the monthly bill in the interim and CSX made up the difference last month in what is known as a "true-up charge."

The carrier provided CSX with its own billing manager. AT&T made a CSX national account team member an AT&T field program manager and moved her to AT&T headquarters, where she reports to an AT&T Tariff 12 manager for CSX's account.

Reed also won a concession from AT&T concerning the fixed minimum annual charge of the original VTNS deal. Reed was concerned that the fixed charge would limit the amount of cost optimization his company could perform.

As a safeguard, CSX got AT&T to jointly market the Tariff 12 deal to other CSX companies and agree to leave the firm's minimum annual charge at the initial rate. "This enables CSX to increase discounts and further reduce the company's chances of falling below the minimum annual charge," Reed said. All but one of CSX's sister companies came aboard.

In addition, Reed convinced AT&T to bend the so-called "80% rule" because of the potential limiting effect it could have on cost optimization. During the length of the agreement, AT&T's Tariff 12 contracts require users to maintain 80% of each type of line and switch port they originally agreed to use or pay penalties.

CSX convinced AT&T to alter the 80% rule to apply to all lines and switch ports, instead of its usual practice of applying 80% for each individual type of line and port. Now, for example, CSX can reduce the number of private lines to below 80% of what it originally contracted for as long as it increases use of T-1 facilities.

Tariff 12 customers that decide to add or delete lines or switch ports make the changes using contract add/delete and baseline price schedules. CSX again called on AT&T, this time to eliminate the gap between the two price schedules.

The baseline service schedule spells out the monthly charge for each element of the customer's initial custom network configuration. The add/delete schedule lists the cost of adding or dropping elements from the network.

A customer that drops a $200 circuit from its Tariff 12 net may only be credited for $150 under the add/delete schedule and charged the $50 difference each month for the duration of the contract.

"We found there was a wide gap, as much as $90 a month, between the baseline schedule for private lines and the add/delete schedule," Reed recalled. "Every time we disconnected one of these lines, we were hit with a big debit." CSX uses almost 1,000 private lines in its Tariff 12 network.

The debits and credits made it difficult for CSX to evaluate and forecast savings that could be realized from cost reduction projects, Reed said.

CSX has since convinced AT&T to agree to make the add/delete and baseline price schedules equal, thus eliminating debit/credit billing.

"We're just now starting to understand Tariff 12," Reed said. "I believe that all the things we went through over the last 60 days should've been [ironed out] six to eight months ago."

US West to offer free blocking

continued from page 4

During the Omaha trial, customers will pay $7.95 per month.

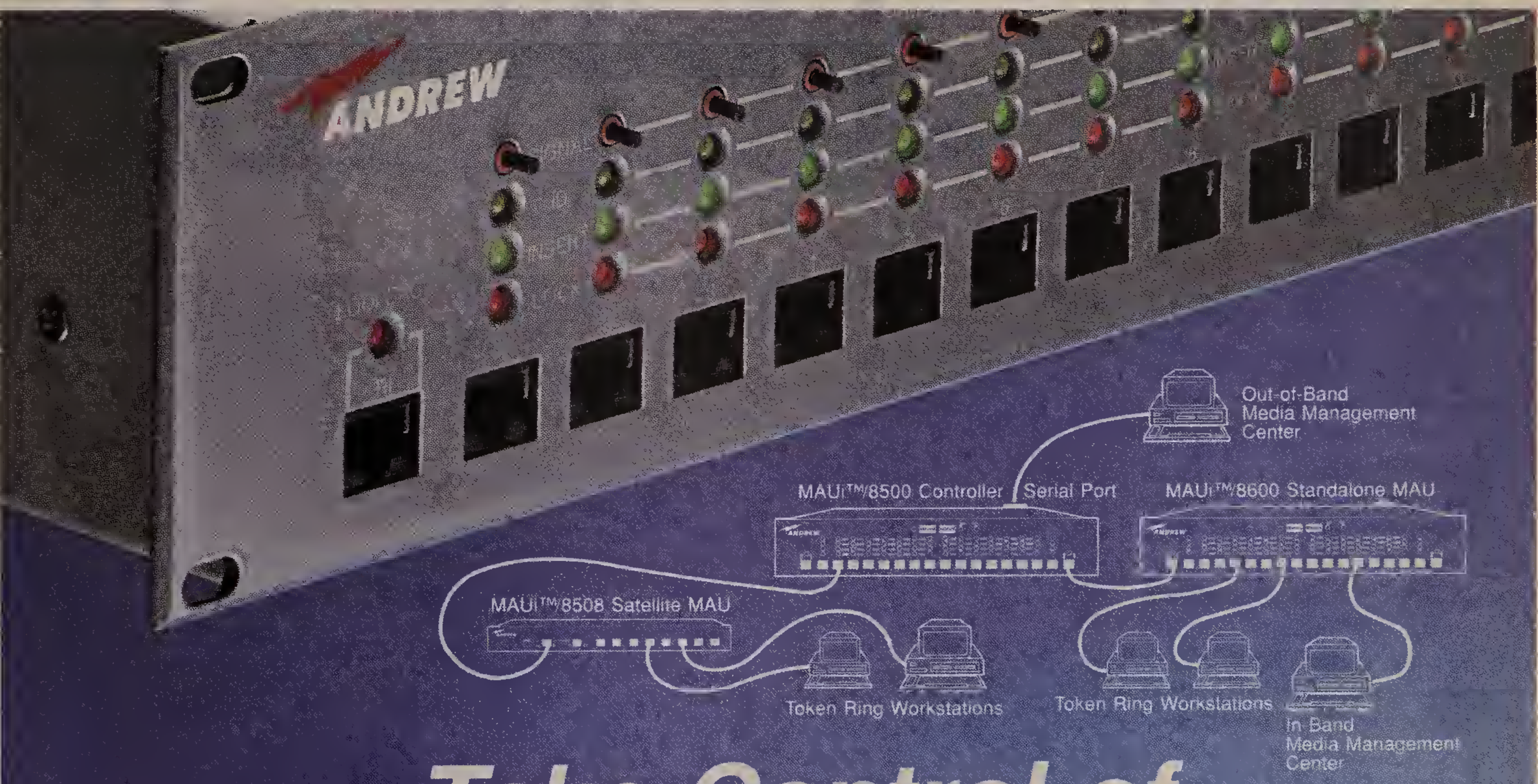
Grant counters suggestions that blocking will allow people to misuse the telephone and shield their identity. If a caller blocks number transmission, the caller ID device will notify the call recipient and the customer can decline to answer the call, he said.

The perfect combination

"We think we've hit the perfect combination — allowing for privacy but still [providing] control and allowing the services to be of value to the customers," Grant said. He emphasized that US West is offering free blocking because customers indicated they wanted it, but he also acknowledged that the offer had kept the company out of a protracted battle with state regulators and possibly state legislators. "Legislation is sometimes a substitute for not listening to customers," Grant said.

Pacific Telesis Group is not currently offering caller ID, but when it rolls out the service in 1991, it will be forced by both states in its territory — California and Nevada — to provide blocking free of charge. Pacific Telesis, citing customer wishes, publicly supports free blocking.

Of the remaining RBHCs, sources said Nynex Corp. and Southwestern Bell Corp. are considering free blocking.



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See The FAXNeT Form on Page 57

Firms speed frame relay rollout

continued from page 1

tion in Greensboro, N.C. "But it takes care of the needed functions for early implementation."

Products supporting the specification can be used with Integrated Services Digital Network services, in private networks, as well as in networks using frame relay-based virtual data services currently under development by carriers. Frame relay can also be used with emerging fast packet switching services.

Frame relay is an emerging ISDN standard for an advanced packet-switching technology designed to support high-bandwidth applications such as linking remote local-area networks.

This standard is a streamlined version of X.25 that reduces the protocol processing overhead inherent in the CCITT packet-switching protocol, enabling users to transmit packets of data between locations much faster.

Frame relay also allows users to dynamically allocate up to a full T-1 circuit of network bandwidth to accommodate bursty data traffic found in LAN bridging, for example.

The four vendors will try to line up support for the specification among other suppliers by making it available at no cost. StrataCom said the specification will be available this week.

In addition, StrataCom will use the joint specification to build a frame relay interface for its IPX T-1 multiplexer. DEC and cisco Systems said they will use the specification to build interfaces for their routers and bridges.

Northern Telecom said the frame relay interface it introduced last month for its DMS-100 and DMS-250 SuperNode central office switches will adhere to the joint specification ("NTI throws weight behind frame relay," *NW*, Aug. 13). That product will let carriers develop frame relay-based virtual data services that can work with or without ISDN.

Sharing with others

StrataCom had been working on its own specification that would adhere to the emerging ANSI and CCITT standards, but it agreed to share its data with the other three vendors when it decided to become part of the joint effort.

In addition to supporting basic data-link layer functions described in the emerging frame relay standards, the joint specification details several enhanced features that the vendors have agreed to implement. These features will support automatic reconfiguration of devices with a frame relay interface and the ability to detect faults in devices using frame relay interfaces.

Since the joint specification has not yet been published, many other vendors, including Network Equipment Technologies, Inc. and Timeplex, Inc., declined to say whether they will support it.

However, Newbridge Networks, Inc. announced it would support the joint specification if it adhered to the emerging standards. Wellfleet Communications, Inc. also said it intends to support the joint specification. Codex Corp., however, said it would not support the joint specification because it is waiting for more fully developed standards.

Analysts say the four vendors are trying to avoid the type of implementation problems that occurred when X.25 products started hitting the market in the 1980s. To this day, users are faced with many implementations of the X.25 standard. This forces users to either install special software to handle the differences or remain with a single X.25 vendor.

"This consortium is very important because it tries to head off the difficulties that first arose back in the early days of X.25," said Nick Lippis, a principal with Northeast Consulting Resources, Inc. in Boston.

The four vendors also represent a strong team. "I don't think we'll see another consortium pop up around frame relay," Lippis said. Since the four vendors will keep the joint specification close to the standards, there will be no need for other vendors to devise a competing implementation, he added. Instead, it is more likely that the vendors will team up to offer enhancements not spelled out in the base frame relay standard or the joint specification. ◻

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Net Courier supports X.25 VANs

continued from page 4

it possible for remote users to send messages to E-mail systems such as IBM's Professional Office System and Systems Network Architecture Distribution Services/DISOSS, as well as MCI Communications Corp.'s MCI Mail.

The Network Courier 2.1 has also been enhanced to support new optional gateways to MHS, SMTP and fax machines. Users of Version 2.1 that want to exchange messages with LANs supporting MHS, SMTP and fax machines need to run the new gateway software on a dedicated personal computer.

The Network Courier 2.1 is available now for $995. Modem Mail costs $495, with a $95 charge per remote user. Existing users can upgrade for $149 and $25 per remote user.

All Consumers Software gateways, as well as Modem Mail, require The Inter-Network Courier, which allows DOS-based LANs to exchange messages.

The gateways will be available in two weeks. Users can receive the MHS gateway free of charge if they purchase The Network Courier between Oct. 1 and Dec. 31. The company has not determined how much the MHS gateway will cost. Pricing has also not been set for the SMTP and fax gateways.

Finally, Consumers Software will announce that it plans to provide a version of The Network Courier designed specifically for NetWare. Expected to be available in the second quarter of 1991, the software will run as a NetWare Loadable Module (NLM) on NetWare file servers.

The Inter-Network Courier's communications component, part of the existing product used to establish connections to other LANs, will reside on the file server as an NLM. Today, by contrast, that communications component resides on a dedicated personal computer. By obviating the need for this dedicated personal computer, this implementation will reduce users' costs.

The NetWare-specific release of The Network Courier will also support the NetWare bindery, the data base containing information about the user, password and other pertinent information. This will relieve users from having to log on to both NetWare and The Network Courier, which previously had separate identifications and passwords. ◘

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IBM rolls out net architecture

continued from page 4

cal interface, NetCenter, supports all those functions; thus, IBM is providing its host source code free of charge when users buy the new NetView Version 2 Release 1, which also includes the NetView GMF host code. GMF workstation code costs $8,000 per workstation, while NetCenter workstation code costs $1,000 to $5,000 per workstation, depending on the functional level required.

Vann Hettinger, division director of communications programming in IBM's Communication Products Division, said IBM does not expect users to install both graphical interfaces.

"It's a significant investment to install either one of these," Hettinger said. Users' investments in either product will be protected since IBM intends to integrate their capabilities, but the migration from NetCenter to GMF would be more signficant since GMF is the long-term strategic product, he added.

NetView support for LU 6.2, which was also expected, promises to make it easier for third-party vendors to tie their non-IBM management systems to NetView and to improve the performance of IBM's management products ("IBM plans Sept. product unveilings," *NW,* Aug. 20).

"The LU 6.2 interface is much easier to use, better performing and a more secure base for network management applications," said Ellen Hancock, vice-president and general manager of IBM's Communication Systems Division.

IBM also beefed up the automation functions provided by NetView with a set of software alert capabilities that let other programs report abnormal status conditions to NetView on their

(continued on page 83)

IBM announcements set stage for future

continued from page 1

erative processing and the concept of a system complex whereby eight MVS/ESA machines can be configured as a single system. The other two new operating systems are VSE/ESA Version 1, which is for entry and intermediate systems, and VM/ESA Version 1, which combines all previous VM systems into a single operating system for interactive applications.

A key feature supported by all new ES/9000s is the Enterprise Systems Connection (ESCON) Architecture, the channel architecture of the machines. ESCON supports 10M byte/sec fiber-optic channels, an increase from the previous channel limit of 4.5M byte/sec on System/370 hosts.

Besides speeding up I/O, ESCON lets channel-attached equipment be located as far as 5.6 miles away from the host, allowing users to extend the glass house by putting equipment such as tape drives, printers or even other mainframes outside the data center.

IBM will also provide improved flexibility in mainframe channel-to-channel and channel-to-controller connections with the newly announced ESCON Director.

Available in two models, one supporting a maximum of 16 ports and one supporting as many as 60 ports, the ESCON Director is a hub device that can handle host channel and control unit links.

The device functions like a matrix switch, giving users the ability to reconfigure data paths among mainframes or control units. For the first time, channels can be added, dropped or switched on the fly without taking the mainframe down.

A new software program, ESCON Manager, runs under MVS/ESA or VM/ESA to give host control over ESCON Director to a NetView, MVS or ESCON Manager console.

IBM announced support and intended support for ESCON on all channel-attachable members of its various controller families, including the 3745 Communication Controller, 3174 Enterprise Controller and the 3172 Interconnect Controller, which attaches local-area networks to IBM mainframe channels.

Taking the spotlight

The 3172, in fact, is taking on an increasingly important role in Systems Network Architecture networks. Last week, IBM announced Model 2 of the 3172. Model 2 supports the 100M bit/sec Fiber Distributed Data Interface.

"Our 3172 Interconnect Controller, which was first announced last year, now attaches all standard LANs to System/370 and 390 hosts," said Ellen Hancock, vice-president and general manager of IBM's Communication Systems Division.

The 3172 Model 2 includes a new, more powerful Intel Corp. 80486 microprocessor for improved performance and capacity. It can attach an FDDI LAN to an IBM System/370 or System/390 parallel channel. IBM announced a statement of direction to provide ESCON support on the 3172 Model 2 and said the existing Model 1 will offer ESCON support in December 1991.

IBM also announced the Remote Channel-to-Channel Feature for the 3172, software that lets a Model 1 device support channel-to-channel communications between remote hosts via T-1 links. As many as four T-1s can be configured as a single transmission group. The same capability was announced as a statement of direction for the Model 2.

IBM said it plans to further exploit the 3172 by giving it support for T-3 links and for the OSI/Communications Subsystem, thus giving devices attached to LANs running Open Systems Interconnection software access to OSI applications on IBM hosts.

IBM announced a decrease in price for the 3172 Model 1 from $23,170 to $15,450 and a reduction in its annual maintenance charge from $925 to $832. The 3172 Model 2, scheduled for availability on Dec. 27, 1991, is priced at $48,500 plus an additional $25,000 for the FDDI adapter.

IBM's Ellen Hancock

IBM also announced two new models of its 3174 terminal controller that support ESCON. The 3174 Model 12L is a floor-standing device, and the Model 22L is a rack-mountable model. Both can be directly attached with a host nearly two miles away or, using an ESCON Director on each end, they can link to a host over 5½ miles away. At those distances, the controller will yield the same performance as a local controller attached to a System/370 channel at 400 feet, IBM said. The ESCON Director can give controllers access to as many as eight hosts via one fiber link.

The new controllers can support as many as 64 3270-type devices and 24 asynchronous devices. IBM also announced an enhancement to its existing high-end controllers so they can support 64 3270 devices, twice their existing capacity. They also support 24 asynchronous devices.

The new models are scheduled for availability this month. The 3174 Model 12L has a base cost of $16,880, and the 22L costs $15,880.

Although IBM did not announce support for ESCON on its 3745 front-end processors, it promised to add the support at a later date. In the meantime, the company

"That reminds me, now that we've managed to network everything, who's going to manage our network?"

Deciding on how to manage a network with different devices, systems and architectures can be an abstract proposition for any company.

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What's more, NetView has been

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will offer a conversion module that makes the 3745 compatible with ESCON.

The company did, however, announce other 3745 enhancements, including a new channel adapter that improves the rate at which data flows between the 3745 and any IBM host. IBM claims that the adapter, which is due out in June of 1991, offers a 100% performance improvement for batch applications and a 25% improvement for interactive applications, thanks to a new scanner.

IBM also expanded the memory allotted to the 3745's Network Control Program to 6M bytes. That means users can configure the front end to support more devices, thus limiting the number of front ends required in their nets. That enhancement is due out in June of next year.

IBM widens LAN portfolio

continued from page 1

wide-area Systems Network Architecture backbone or X.25 net. That program, dubbed IBM LAN to LAN Wide Area Network Program, supports Network Basic I/O System LANs.

The software, which runs under OS/2 Extended Edition, can be installed on a single workstation to provide access to a wide-area net for all workstations on the LAN. It supports IBM Token-Ring Networks, IBM PC Networks and Ethernets.

The IBM LAN to LAN Wide Area Network Program can support as many as 48 simultaneous sessions. "It's a quick and easy way to link LANs, preserving your investment in your wide-area SNA network," said David Passmore, a partner at Network Strategies, the network consulting practice of Ernst & Young in Fairfax, Va.

But Passmore said there may be performance problems for applications that require real-time access to a remote server, for example, since most SNA links are based on 9.6K bit/sec lines.

Scheduled for availability in April, the software costs $1,995.

LAN management

IBM's new LAN Network Manager reports faults on media or LAN interfaces to the console operator and, used with the 8230 CUA, enables the operator to isolate the exact location of the fault and to disable a station if necessary.

Version 1.0 of the product, scheduled for release in April 1991, provides an OS/2 Extended Edition-based data base to store LAN management data. That data, which can be accessed using SQL, can be used to create reports based on user criteria.

Version 1.0 also supports a mouse-driven user interface based on IBM's OS/2 Presentation Manager. With Version 1.1, due out in December of next year, that interface will be further enhanced with an optional full-blown graphics capability.

Version 1.1 also provides expanded NetView control over LAN Network Manager with support for 80 commands, rather than the 12 supported by LAN Manager.

A scaled-down version of LAN Network Manager, dubbed LAN Network Manager Entry, offers the same capabilities as Version 1.1 but without the user interface. The new version is intended to be used in centralized configurations with NetView.

Version 1.1 of LAN Network Manager will also support the new LAN Station Manager. The Station Manager runs on each LAN-attached DOS or OS/2 workstation and uses Open Systems Interconnection Common Management Information Protocol/Common Management Information Services to communicate with the LAN Network Manager.

The Station Manager supplies to LAN Network Manager detailed LAN station information, including configuration data, data regarding what software it is running, office location and other information that is important for asset management.

Scheduled for availability in December 1991, the LAN Station Manager costs $66; additional licenses are $44.

The 8230 CUA can pass detailed information to the LAN Network Manager that lets net managers isolate workstations for inventory management or if there is a problem that requires maintenance.

The 8230 is IBM's first entry into the intelligent access unit market, an area where IBM lagged behind competitors such as Proteon, Inc. and Ungermann-Bass, Inc. Its previous access unit, the 8228, lacked its own microprocessor, and supported just eight devices and a distance of only 100 meters to attached devices.

With the 8230, that distance is extended to 375 meters for 4M bit/sec LANs and to 145 meters for 16M bit/sec LANs.

Users can add devices using lobe attachment modules (LAM), which each support up to 20 LAN-attached devices, which IBM calls lobes. As many as four LAMs can fit into the 8230 chassis to support a total of 80 devices.

The 8230 supports the LAN Network Manager's access control capability, which allows an 8230 port to be disabled, thus ensuring that only authorized users are permitted on the network.

It also has the ability to take out of service — either automatically or by direction from the LAN Network Manager — a failed lobe, LAM or an entire 8230.

The LAMs come in two versions — one of which supports the IBM Cabling System and the other for unshielded twisted pair. The 8230 is shipped with support for a copper main ring but also works with fiber.

Scheduled for availability in March of next year, the 8230 costs $3,000, and each LAM is priced at $2,050. The optional fiber converter module costs $1,250.

LAN Network Manager Version 1.0 costs $3,995, and Version 1.1 lists for $4,995. LAN Network Manager Entry is priced at $1,300, and additional licenses cost $1,250.

enhanced, making it easier than ever to use, monitor problem alerts, and "talk" with IBM and non-IBM systems.

Of course, there are other attractive features of NetView to consider.

Like how it helps you better manage your company's voice and data information.

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ALLIGATORS IN THE SWAMP

Unforeseen problems that can put the bite on your network

The broadcast faxing fix

By MARK LANGNER

Facsimile is now a fact of life for most corporations. In the past few years, fax usage has soared both domestically and globally, and is expected to climb even higher in the future.

As a small business, TeleChoice, Inc. has seen its fax usage quadruple in just nine months. One of the biggest problems we've encountered has involved broadcasting, or sending one facsimile message to multiple destinations. Today's higher priced fax machines, those costing $2,000 and more, have functions that allow users to broadcast messages without constantly feeding the original into the fax machine for each transmission. Instead, the user loads the fax message into the machine's memory, and the machine dials from a preset list of numbers.

We thought we had it covered when we bought a $2,500 single-line Sharp Electronics Corp. FO-550 fax machine complete with these internal memory storage and broadcast mode features. However, we soon discovered that this model — like many other fax machines — is capable of storing a maximum of only 12 pages of standard fax text. While this maximum may be enough for many companies, it fell short of our requirements.

While some fax machines can be upgraded for more memory, ours could not. We were limited to sending out our broadcast messages in 12-page sections. Some offices would receive half of the document and never realize the other half was missing, or they would get the second half and not the first half.

Another problem we ran into concerned time. In broadcast mode, a single-line fax machine sends its messages in a serial manner — it dials the first number of the broadcast list, sends the message if it can and then proceeds to the next number. If you have 20 messages, each 10 pages long, you could find yourself tying up the fax machine for five or six hours. What's more, if the message does not go through on the first attempt because a line is busy, the fax machine will redial for a preset number of times, further tying up the machine.

Some managers try to avoid this problem by transmitting after hours. However, even operating in broadcast mode, the fax machine needs some supervision. For example, some fax machines will cancel a broadcast if an incoming message is received during the seconds it takes for the fax to hang up after sending one message and dialing the next number.

We started investigating other options. The cost for memory-rich fax hardware ranged from a $3,000 single-line machine to a full in-house fax switch for $40,000. Personal computer-based fax solutions were less expensive but still had the serial transmission problems; we didn't want to tie up a line for that long.

Calling all carriers

The next logical step was to turn to our local and long-distance carriers for help. Our first stop was Southern New England Telephone Co. (SNET), our local carrier, which had started its own fax broadcast service last year.

SNET's rates were 75 cents for the first minute and 50 cents for each additional minute. The rates for overnight delivery — 12 a.m. to 6 a.m., every day — were 60 cents for the first minute and 40 cents for each additional minute. Given that our present cost per minute, using our fax machine over regular business lines, was around 19 cents during the day, we believed that there were less expensive alternatives.

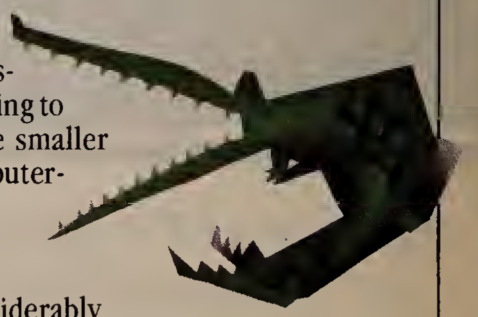
Next we called AT&T. Its product, AT&T Enhanced FAX, also seemed expensive. AT&T charges as much as 58 cents per page for domestic delivery, depending on the number of recipients of the broadcast, which made it difficult to compare to our per-minute costs. In addition, there were setup and monthly fees plus charges for delivery reports and list maintenance. While list maintenance charges are currently being waived, all of these costs added up to more money than we were willing to spend on fax service.

The next stop was US Sprint Communications Co. Its product, SprintFAX, which was introduced earlier this year, is designed around a personal computer-based program that interfaces with the fax network. Moreover, the usage rates were fairly low — 50 cents per minute for domestic calling during peak hours, 35 cents per minute during off-peak hours. But since we are a small firm, we couldn't justify the $500 initial fee to set up the account and software.

Finally, we called MCI Communications Corp. Its business center answered all of our questions about how its service, MCI Fax Broadcast, worked and how we could use it to solve our particular problems. In one day, we had an authorization code, an 800 number accessible from anywhere in the U.S. and a data base of our most frequently dialed numbers in its system. Like US Sprint, rates were 50 cents per minute peak and 35 cents per minute off-peak, with calls rounded to the nearest six seconds, subject to a 30-sec minimum. To broadcast, we send the fax only once to MCI's main fax switch via an 800 number and enter either a code to identify a broadcast list already stored in the network or the destination phone numbers. Then, the MCI network transmits the message to all locations in a near-parallel fashion — that is, all messages arrive at their destinations at approximately the same time. What's more, the fax message arrives at all of its destinations in one piece rather than in parts, with no maximum page limit. At the end of the transmission, we receive a single report detailing the status of each message — when it was sent, any problems in transmission, and any messages not sent and why.

Still growing

Our demands are growing, however. Currently, we have to manually enter each number into the MCI Fax Broadcast network before sending the document or wait as long as 24 hours for list changes to be made by sending special fax forms to MCI. Since we send broadcast messages rather spontaneously, we have been using the manual entry at the time of transmission, which has several drawbacks. First, we have to enter all digits correctly; on occasion this totals more than 100. If there is one error, we have to reenter the entire list. Second, lists entered manually are not stored by MCI, so if we need to send an update or second transmission to the same list, we have to reenter it. Finally, the system can only store 128 digits at a time. If we are sending to a long list of people, we must transmit in multiple smaller lists. As a result, we are reviewing personal computer-based list maintenance options. Currently, AT&T, Cable & Wireless Communications, Inc., MCI and US Sprint offer fax network software.



Thanks to the fax service, our fax machine is considerably less busy with outgoing fax messages, which leaves it open for important incoming messages. Machine availability is perhaps one of the more neglected aspects of fax usage today. Since many transmissions are automated, companies are not always aware of incoming blockage problems. Check the usage on your fax lines; you might be surprised. Fax management is only going to get more critical in the future, so start paying attention now.

Langner is an associate with TeleChoice, Inc., a Manchester, Conn.-based consulting firm specializing in long-distance competitive analysis and strategic product design.

IT'S HARD TO DRAIN THE SWAMP when those reptiles keep getting in the way. To share your "alligator story," call Susan Collins, assistant features editor, at (508) 820-7413, or fax your idea to (508) 820-3467.

Cabletron set to unveil products

continued from page 4

MMAC chassis, Cabletron will offer a repeater interface. With the new TRMIM-16, users can extend the maximum shielded twisted-pair distance between MMACs from 200 meters to 760 meters. They can also use fiber-optic cabling to extend the distance to two kilometers. Unshielded twisted pair is not used between hubs.

The repeater card costs $3,495 and is available now.

To manage the token-ring LANs, Cabletron will offer a management interface that works with the company's LANView line of software, which runs on DOS and Unix workstations. Both versions support the Simple Network Management Protocol (SNMP).

The management interface, Token Ring Management Module (TRMM), performs physical-layer management for all token-ring interfaces in the MMAC hub. It gathers statistics on lost tokens and beaconing, a process by which a token-ring node repairs a ring that has been broken. It also enables a network manager to reconfigure the network, enabling or disabling a specific port on the MMAC. TRMM will be available within 60 days for $4,995.

SynOptics does not currently offer management capabilities for its token-ring products but will likely do so by early 1991, according to Don Miller, director of marketing for SynOptics. The company will extend the SNMP agent it now offers for Ethernets to the token-ring environment, he said.

Cabletron will also announce an interface that supports token-ring bridging and supports the same management capabilities of the TRMM. The Token Ring Management Bridging Module (TRMBM) connects two token rings over a distance of two kilometers. Unlike the repeater, however, it filters traffic rather than broadcasting it and can be used to create subnets to improve net performance.

The bridge can connect token rings operating at different speeds. It supports the Spanning Tree Protocol (STP), which is used by NetWare LANs, as well as IBM's source routing and source routing transparent, a proposed Institute of Electrical and Electronics Engineers, Inc. standard that combines the capabilities of STP and source routing protocols. TRMBM costs $6,995 and is scheduled for availability within 60 days.

Finally, the company will introduce a low-end passive hub that supports eight token-ring connections via shielded twisted-pair cabling. The Token Ring Concentrator 800 is intended primarily for smaller offices or LANs that may require connection through a bridge to an MMAC hub. It costs $595 and is available now.

Retiming device eliminates jitter

continued from page 7

maximum distance of 330 feet between the wiring concentrator and workstation or attach the maximum 260 nodes specified in the IEEE 802.5 standard, the sources said. Most 16M bit/sec token-ring adapter users could only attach about 70 to 100 nodes on a single token-ring net and locate their workstations about 100 feet from the hub.

The jitter problem on 16M bit/sec token-ring adapters first came to light in July when Madge Networks, Ltd. recalled 800 of its 4M/16M bit/sec adapters following complaints from a user that experienced an excessive number of data transmission errors on a 30-node local-area network ("Madge Networks recalls faulty token-ring adapters," *NW*, July 2).

While other vendors have not had to recall their adapters, they did complain about similar problems with the TI Falcon chip at an IEEE 802.5 meeting in mid-July.

The problem stemmed from the fact that TI's Falcon chip — which technically meets all of the IEEE 802.5 data sheet specifications — is susceptible to other components on the adapters, according to Leon Adams, TI's open systems marketing manager in charge of LAN products.

Many factors influence an adapter's functionality, Adams said, including on-board passive components, circuit board layout and other devices on the LAN such as the multistation access unit.

In the absence of a common solution to the jitter problem, vendors such as Olicom USA and Proteon tested and added their own passive circuitry and filters to the TI chipset to circumvent the problem and insulate the adapters from noise.

Users on hold

If the Proteon retiming device fixes the jitter problem, it will be good news for the thousands of LAN users that have been unable to purchase the number of adapters they need because of ongoing production problems. Those problems have resulted in delayed and limited availability of the TI chipsets.

IBM, which supplies more than 95% of all 16M bit/sec token-ring adapters, has found itself hard pressed to keep up with the increasing demand, according to a company spokesman. IBM shipped more than 1.5 million 16M bit/sec token-ring adapters last year and recently added a third U.S. assembly plant to keep up with burgeoning user demand for the high-speed token-ring boards.

Third-party vendors such as Madge, Olicom and Proteon report that they have backlogged thousands of orders for the adapters.

IBM rolls out net architecture

continued from page 79

own, without intervention from the NetView operator.

For example, when the NetView Performance Monitor exceeds a user-defined threshold, it could automatically report that condition to NetView.

Another example is the new NetView Bridge, which supports a link to the data base of IBM's Information/Management problem management system. With the link, trouble tickets can be opened automatically in Information/Management when NetView detects an error condition, Hettinger said.

NetView Version 2 Release 1, which includes the NetView GMF and NetView Bridge, will be available Dec. 31 for MVS/ESA and MVS/XA. The same functions, plus LU 6.2 support, become available in Version 2 Release 2 for all other operating systems. That release is expected to be available on Sept. 30, 1991, for MVS/ESA and MVS/XA, on Dec. 31, 1991, for VSE and on March 31, 1992, for VM/ESA and VM.

As expected, the NetView pricing structure has been changed to allow users to run subsets of the system on some hosts.

NETWORK WORLD

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Pilot offers PC version of tool

continued from page 2

While most EIS products on the market today are mainframe-based, Pilot wanted to extend the benefits of EIS systems to the growing number of personal computer users at all levels of management, according to David Friend, chairman of Pilot. The 7-year-old company also markets a leading mainframe-based EIS system called Command Center.

Users will move to personal computer-based EIS systems in LAN environments for many reasons, said Eileen Carlson, manager of EIS services at Integrated Technologies, Inc., a consultancy in Rolling Meadows, Ill.

LAN-based systems give each department within a company the ability to customize EIS applications to meet its particular data requirements, she said.

Using the DDE communications protocol of Microsoft Windows 3.0, LightShip users can access data in any Microsoft Windows-compatible application on a LAN server or standard SQL data base on a host system.

For example, a LightShip application might integrate data from a spreadsheet on the file server, a corporate SQL data base running on a Digital Equipment Corp. VAX or an external news source such as the Dow Jones News/Retrieval service.

LightShip accesses information on corporate or third-party hosts through gateways. Companies can also program their host to download information periodically via the gateway to file servers serving LightShip users.

LightShip uses object-oriented programming to allow users with little or no programming experience to build EIS applications that can bring together up-to-the-minute data such as weekly sales statuses or budget forecasts, Friend said. Users can define the data they want to access and the format in which it will appear on their computer screen.

Users can access increasingly detailed information about a particular subject by opening multiple layers of associated screens. Each time a new screen is opened, LightShip retrieves data from the network and presents it in the proper format. If an application contains a chart, the size and parameters of those elements automatically change to reflect the data on each new screen.

LightShip software runs on personal computers with Intel Corp.'s 80286 or higher microprocessors, a minimum of 2M bytes of internal memory and 2.5M bytes of disk space.

It is available now. It costs $795 for a single personal computer and $500 for 1,000 or more units.

Boeing to test compatibility

continued from page 2

But if that is not possible, Vanderwilt said, Boeing at least wants to find out "how faithful the information is after it's been interchanged" between systems.

The idea for the test came after Vanderwilt witnessed a demonstration of ODIF-based software last March at the CeBIT show in Hannover, West Germany. In the demonstration, 14 vendors showed compound documents being exchanged between their systems.

After returning to the U.S., Vanderwilt persuaded Bull HN Information Systems, Inc., Digital Equipment Corp. and Xerox Corp. to let Boeing test their various ODIF-based software.

DEC is providing an ODIF-based version of its DECwrite word processing software for the demonstration, while Bull is letting Boeing test an early version of its ODIF-based word processing package. Xerox is supplying an ODIF-based version of its ViewPoint desktop publishing package.

In the test, Boeing will create a compound document by pulling text and graphics from a DEC VAX, a Bull microcomputer, and Xerox and Sun Microsystems, Inc. workstations attached to a local-area network. Each vendors' ODIF-based software will convert its proprietary data formats to OSI's Abstract Syntax Notation.1 (ASN.1) format, which will be used to form the document.

The ASN.1 data representing the compound document will be wrapped in an X.400 envelope and transmitted across the VAN to a receiving node running ODIF-based software. The receiving node will translate the ASN.1 data to the proprietary data format supported by the software running on that machine and display the document on the screen.

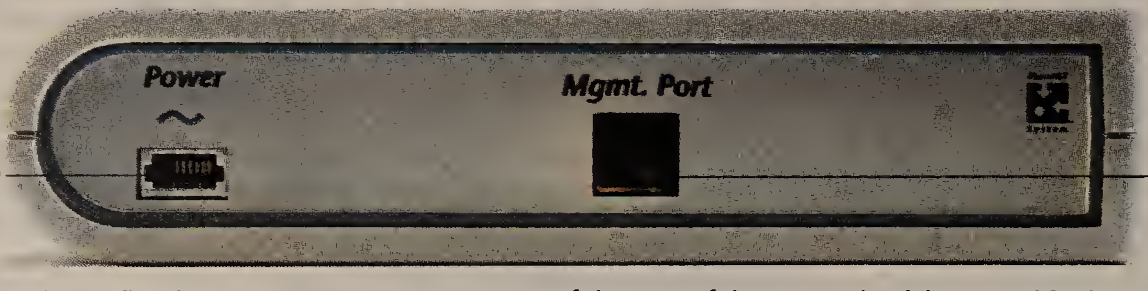
The receiving node will then make some changes to the document and send it back.

Because of the conversions, Vanderwilt said there is a chance that the typeface used by the package creating the document may not be supported by the package receiving the document. This could result in the document having a different appearance when dislayed by the receiving package.

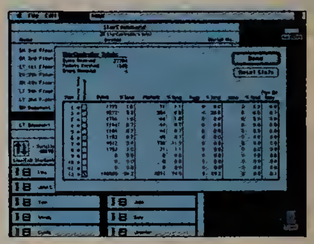
The test will help Boeing determine to what extent things are displayed differently. It will also give Boeing and du Pont an opportunity to tell the vendors how they should modify their packages to satisfy user needs.

"This will give the vendors a chance to find out what we really want," Vanderwilt said.

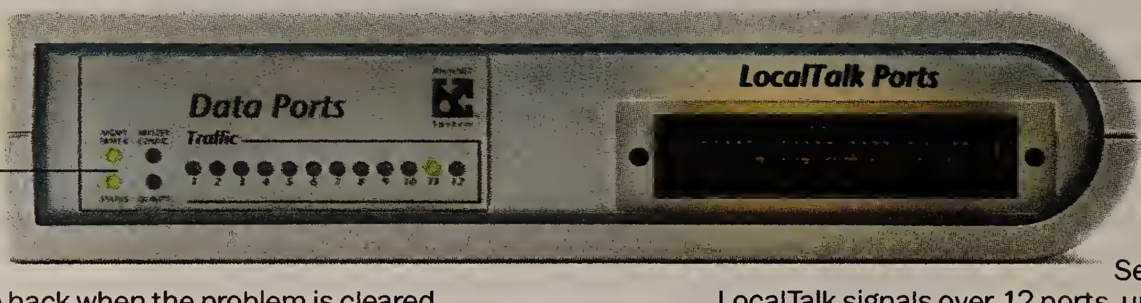
Our new StarController has reliability written all over it.



Reliability starts here. The new PhoneNET StarController® Series 300 has just the right amount of output voltage: +/– 3.5V, the same as a Macintosh. Any more and you get noise, electrical reflections, and "crosstalk"—electrical phenomena that can make a network unreliable.

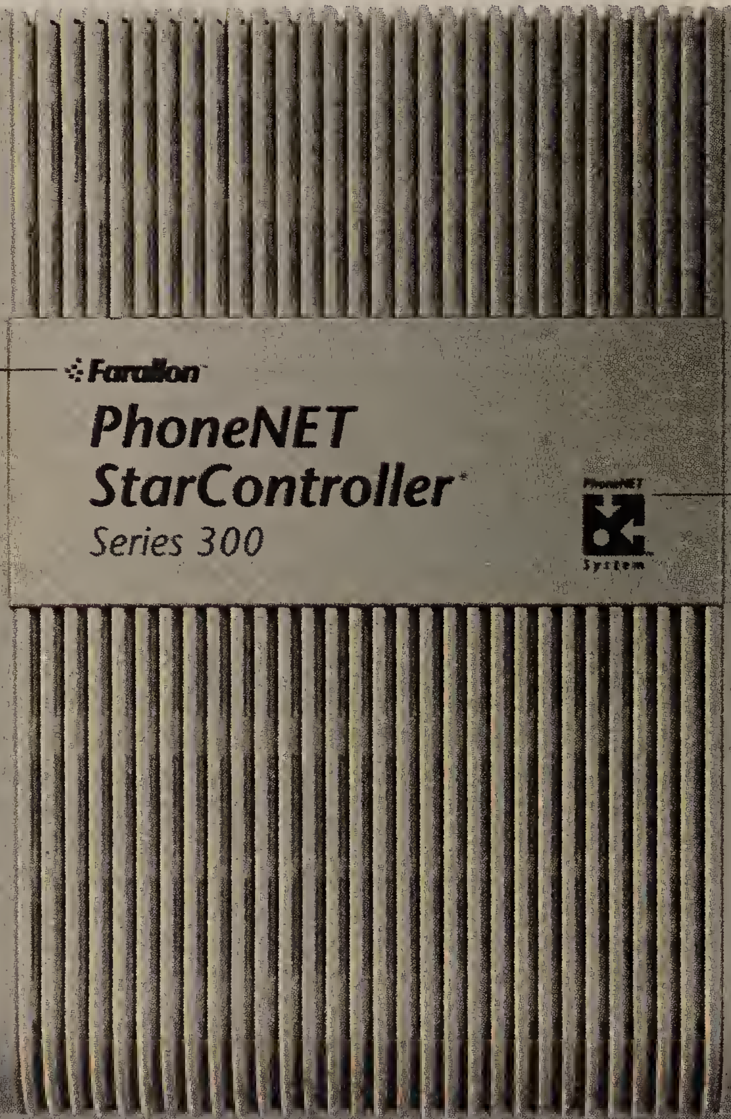


Even when everything else is down, you're up. The Series 300 external Management Bus operates outside of the rest of the network, giving your Macintosh data about the network even when a network is down. StarCommand™ software monitors port status automatically, and notifies the manager about problems for both LocalTalk and Ethernet networks. Plus, you get network diagnostics and traffic analysis.



LEDs provide a reliable way to shed light on port status and signal quality. The Series 300 detects jamming, automatically removes malfunctioning nodes from the network, and puts them back when the problem is cleared. It's the only hub that reports noise problems. The Series 300 delivers lots of data about each port, and even maintains port status during power failures.

When you're down to the wire, the Series 300 works reliably with twisted pair, quad cable or 25-pair cable. Which means you can build a reliable network in any building anywhere. The Series 300 amplifies and repeats LocalTalk signals over 12 ports, up to 48 offices. Each port will support 3,000 feet of cable to Apple computers and peripherals, and other LocalTalk-compatible devices.



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Reliablity has its mark. Our first generation of StarController hubs is still performing reliably for over 400,000 users —with less than 1% failure in three years. The PhoneNET® System logo is your assurance that the Series 300 will perform to specifications. It guarantees that the Series 300 is compatible with the entire PhoneNET System family of network products, including the StarController™ EN for use on Ethernet networks. And it assures you of extensive, high-quality documentation on network design, technical specs, and management and troubleshooting help.

For the name of the Farallon dealer nearest you, call Customer Service at (415) 596-9000. Dealers call our Reseller Hotline 1 (800) 344-7489.

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See The FAXNeT Form on Page 57

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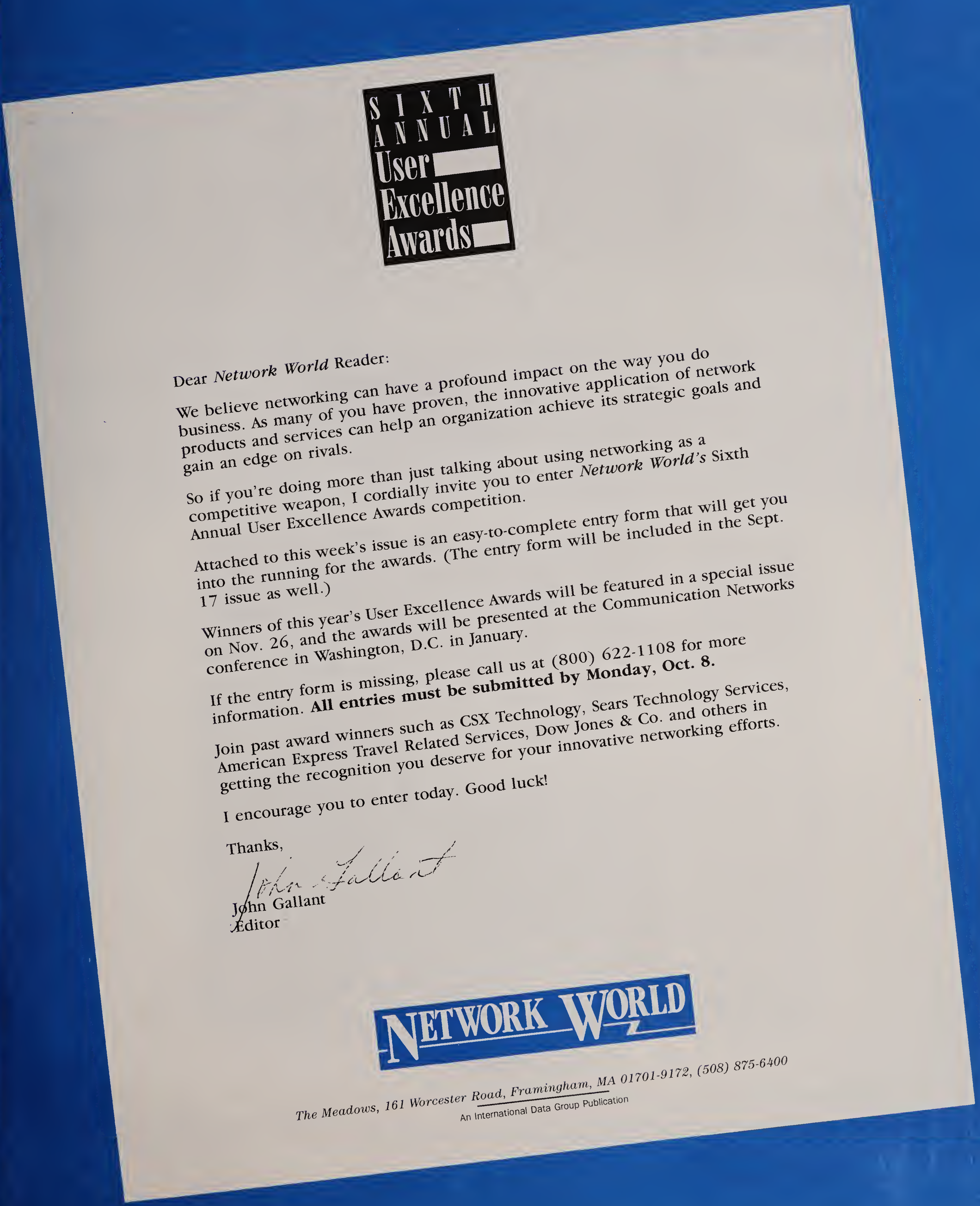

SIXTH ANNUAL
User Excellence Awards

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So if you're doing more than just talking about using networking as a competitive weapon, I cordially invite you to enter *Network World's* Sixth Annual User Excellence Awards competition.

Attached to this week's issue is an easy-to-complete entry form that will get you into the running for the awards. (The entry form will be included in the Sept. 17 issue as well.)

Winners of this year's User Excellence Awards will be featured in a special issue on Nov. 26, and the awards will be presented at the Communication Networks conference in Washington, D.C. in January.

If the entry form is missing, please call us at (800) 622-1108 for more information. **All entries must be submitted by Monday, Oct. 8.**

Join past award winners such as CSX Technology, Sears Technology Services, American Express Travel Related Services, Dow Jones & Co. and others in getting the recognition you deserve for your innovative networking efforts.

I encourage you to enter today. Good luck!

Thanks,

John Gallant

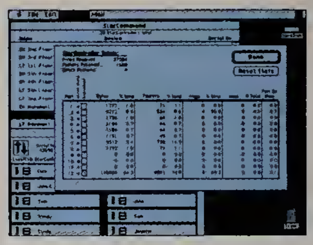
John Gallant
Editor

NETWORK WORLD

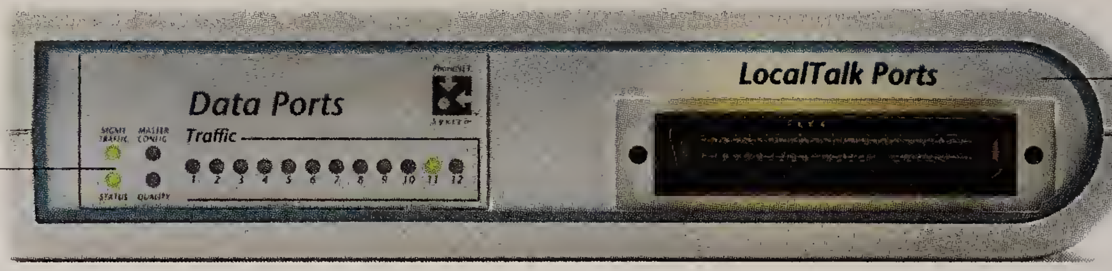
The Meadows, 161 Worcester Road, Framingham, MA 01701-9172, (508) 875-6400
An International Data Group Publication

Our new StarController has reliability written all over it.

Reliability starts here. The new PhoneNET StarController® Series 300 has just the right amount of output voltage: +/– 3.5V, the same as a Macintosh. Any more and you get noise, electrical reflections, and "crosstalk"—electrical phenomena that can make a network unreliable.

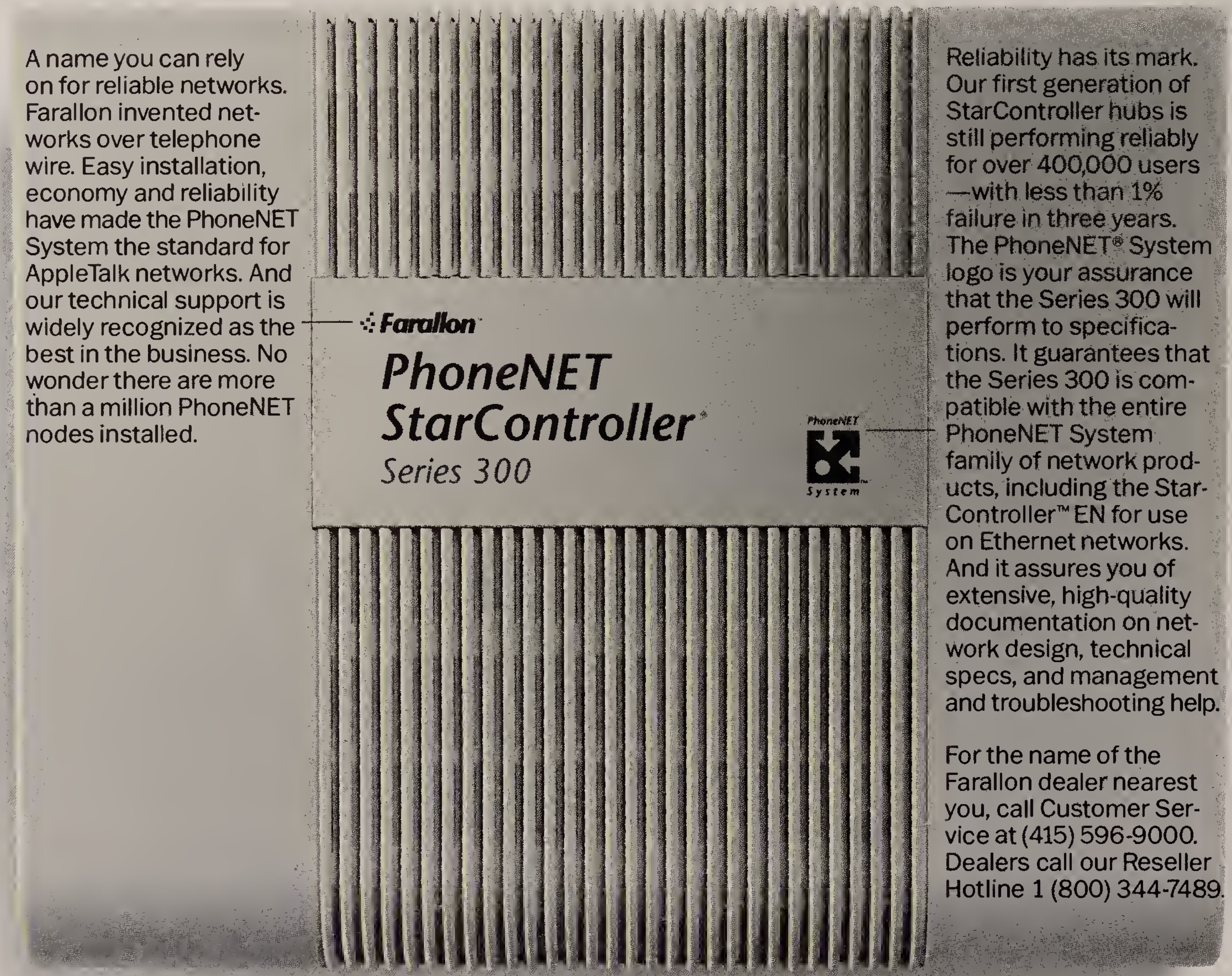


Even when everything else is down, you're up. The Series 300 external Management Bus operates outside of the rest of the network, giving your Macintosh data about the network even when a network is down. StarCommand™ software monitors port status automatically, and notifies the manager about problems for both LocalTalk and Ethernet networks. Plus, you get network diagnostics and traffic analysis.



LEDs provide a reliable way to shed light on port status and signal quality. The Series 300 detects jamming, automatically removes malfunctioning nodes from the network, and puts them back when the problem is cleared. It's the only hub that reports noise problems. The Series 300 delivers lots of data about each port, and even maintains port status during power failures.

When you're down to the wire, the Series 300 works reliably with twisted pair, quad cable or 25-pair cable. Which means you can build a reliable network in any building anywhere. The Series 300 amplifies and repeats LocalTalk signals over 12 ports, up to 48 offices. Each port will support 3,000 feet of cable to Apple computers and peripherals, and other LocalTalk-compatible devices.



A name you can rely on for reliable networks. Farallon invented networks over telephone wire. Easy installation, economy and reliability have made the PhoneNET System the standard for AppleTalk networks. And our technical support is widely recognized as the best in the business. No wonder there are more than a million PhoneNET nodes installed.

Reliability has its mark. Our first generation of StarController hubs is still performing reliably for over 400,000 users—with less than 1% failure in three years. The PhoneNET® System logo is your assurance that the Series 300 will perform to specifications. It guarantees that the Series 300 is compatible with the entire PhoneNET System family of network products, including the StarController™ EN for use on Ethernet networks. And it assures you of extensive, high-quality documentation on network design, technical specs, and management and troubleshooting help.

For the name of the Farallon dealer nearest you, call Customer Service at (415) 596-9000. Dealers call our Reseller Hotline 1 (800) 344-7489.

Farallon™

The Personal Communications Company™

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SIXTH
ANNUAL
User
Excellence
Awards

Call for Entries

Network World believes networking can change the way organizations do business, helping them become more competitive, more productive and more responsive to opportunities and changing market forces. Each year, through our annual User Excellence Awards, we honor users that have applied network technology to gain competitive advantages.

Winners of this year's User Excellence Awards will be featured in the November 26 issue of *Network World*. The awards will be presented at the Communication Networks conference in Washington, D.C. in January.

Here's your chance to spotlight your networking efforts and get into the running for the Sixth Annual User Excellence Awards. Please submit a 250- to 500-word abstract explaining how networking has helped your organization achieve its strategic goals.

Has networking helped you differentiate your products and services from those of competitors or launch new products and services? Has networking helped you bring products to market more quickly? Have network technologies such as EDI helped you build closer, more productive relationships with customers, suppliers or other business partners?

The size of your network isn't important — it's how networking has helped you achieve your objectives that matters.

You may write your abstract in the space provided below. This form is a prepaid mailer that can be sealed and returned at no expense to the address on the reverse side. You may also fax your entry to us at (508) 820-3467 or mail it to: Special Projects Editor, Network World, 161 Worcester Road, Framingham, Mass. 01701.

Please be sure to include your name, title, address and telephone number. All entries must be submitted by Monday, Oct. 8.

Get the recognition you deserve for your innovative networking efforts by entering *Network World's* Sixth Annual User Excellence Awards today. Good luck!

Entry Form

To enter *Network World's* Sixth Annual User Excellence Awards, please submit a 250- to 500-word abstract outlining how networking has helped your organization achieve its strategic goals. You may use this pre-paid entry form or submit an abstract via fax at (508) 820-3467 or by mail to:

Special Projects Editor,
Network World, 161 Worcester Road,
Framingham, Mass. 01701.
All entries must be submitted by Monday, Oct. 8.

1. Name: ______________________

Title: ______________________

Company name: ______________________

Address: ______________________

____

Phone number: ______________________

2. Abstract: ______________________

(Additional space on the reverse of this form)

NETWORK WORLD

Join the elite corps of network innovators

Enter *Network World's* User Excellence Awards

Past User Excellence Award winners

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